Industrial Medicine

for

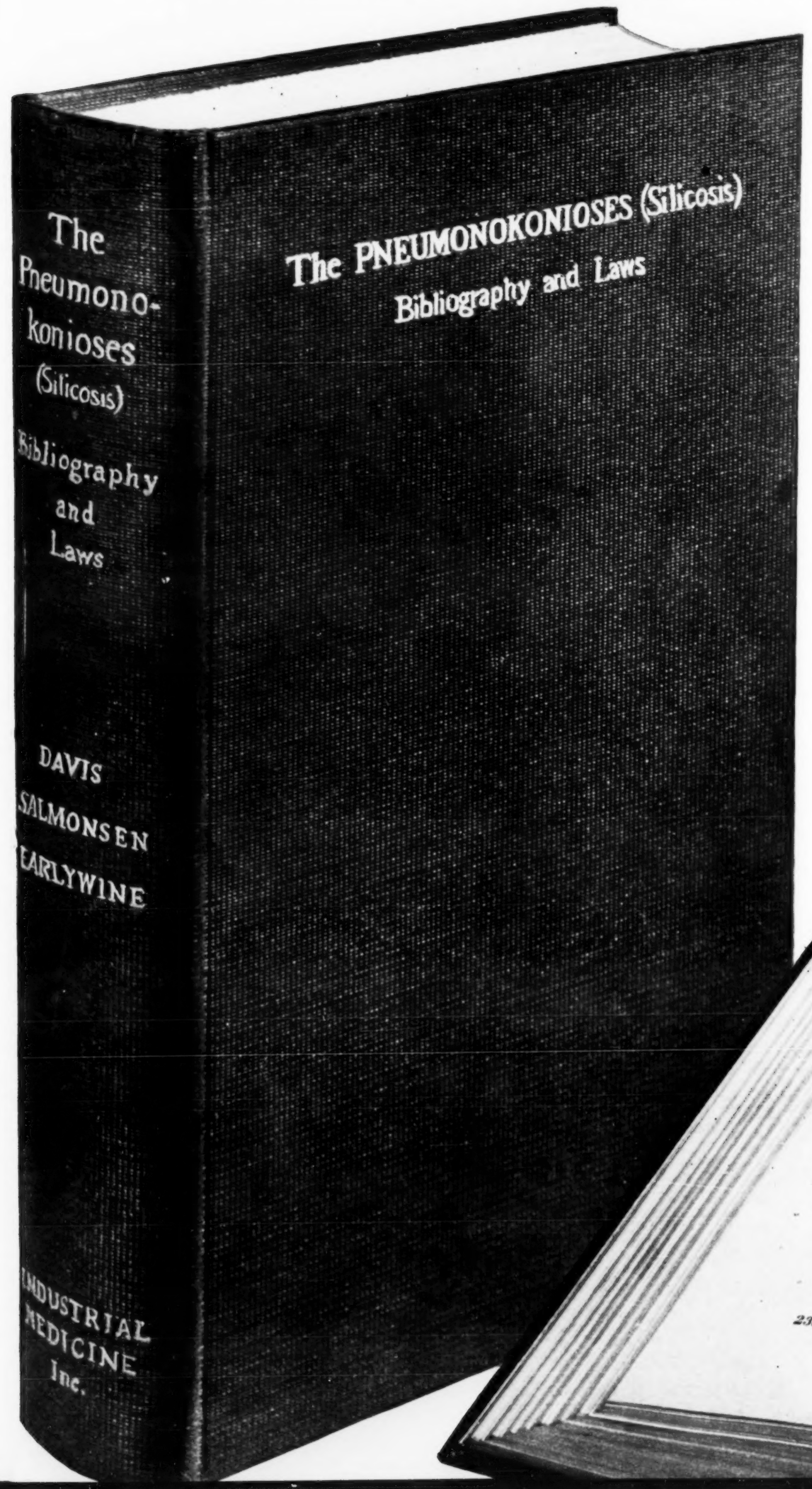
Physicians and Surgeons in Industry

The Pneumonokonioses (Silicosis)

Bibliography *and* Laws

All the References of the World's Literature
--- from 1556 to December 31, 1933 ---

This a Book of References—it is not a Textbook—Its purpose is to put between two covers **all the references of the world's literature** on the Pneumonokonioses, so that anyone interested in the subject can quickly find out:
Who said **what**—and **when**—and **where**—
And to furnish easy access to the state law sections covering the industrial regulations.
This Book does just that.
"The Pneumonokonioses" is a **Source** book, in compact, convenient form. The editors, sensing the great need for such a comprehensive, handy reference, have produced a work which already has earned the thanks of professional men from coast to coast.



The Editors

George G. Davis, M.D., Associate Professor of Surgery at Rush Medical College, University of Chicago; Attending Surgeon Cook County Hospital.

Joseph L. Earlywine, Attorney at Law, Chicago. Both Dr. Davis and Mr. Earlywine are well known throughout the middle west from years of honorable medicolegal service.

Ella M. Salmonsen, Medical Reference Librarian at The John Crerar Library, Chicago. Physicians and students of medicine have been familiar with her efficiency at the library for many years.

Contents: Sec. I—Bibliographical References 1556-1933; followed by Subject Index, Author's Index, Index of Reference Group Headings, and Reference Index.
Sec. II—Laws of the States—Leading Cases.

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Industrial Medicine

844 Rush Street
Chicago, Illinois.

"Bad Luck, she is never a lady
But the commonest wench on the street,
Shuffling, shabby and shady,
Shameless to pass or meet.
Walk with her once—it's a weakness!
Talk to her twice—it's a crime!
Thrust her away when she gives you 'good day'
And the besom won't board you next time.
Largesse! Largesse, Fortune!
What is Your Ladyship's mood?
If I've no care for Fortune,
My Fortune is bound to be good!
Good Luck she is never a lady
But the cursedest queen alive!
Tricksey, wincing and jady,
Kittle to lead or drive.
Greet her—she's hailing a stranger!
Meet her—she's busking to leave.
Let her alone for a shrew to the bone,
And the hussy comes plucking your sleeve!
Largesse! Largesse, Fortune!
I'll neither follow nor flee.
If I don't run after Fortune
Fortune must run after me!"
—KIPLING.

Industrial Medicine
Reg. U. S. Pat. Off.

The Journal of Traumatic Surgery and Occupational Diseases

The Law, the Science and the Economics of Industrial Health

Volume 4 DECEMBER, 1935 Number 12

The Medical Department of *The New York Times*

—A Survey of the Work Period from 1921 Through 1932—

THE SURVEY was made at the end of 10, 11 and 12 years. The medical records for the 10-year period were studied as a whole in the first survey. The years 1931 and 1932 were studied separately. Such a plan of survey has provided for a yearly contrast of record material and the contrast of two consecutive years with the previous 10 years.

The case records include two distinct groups of individuals doing similar work under the same conditions and circumstances. The first group was selected naturally, viz., without medical examination. The second group were all examined before employment, and a medical selection was made. The individuals in the two groups were employed in the various tasks of the company. These tasks comprise a wide field of work, and most every type of skilled and non-skilled workman is represented. The important differences in the two groups are: the first group was relatively large in the beginning; the second small. The first group has grown smaller and the individuals older; the second, larger and age is not yet an important factor.

The medical data accumulated by the survey contain material that is of interest in a consideration of special benefit plans and of the ordinary industrial insurance plan. In addition, data of this kind will be needed to formulate plans for all types of social insurance, and any type of insurance or benefit plan that deals with medical selection of individuals for employment.

A collection of further data of the same kind would make it possible for the employer to plan to accept all individuals on a physical rating based on previous medical experience.

The Board of Directors of The New York Times Company established a sick benefit plan in 1921. The disability benefits for loss of time due to sickness or accidents were:

a. If the term of employment has been 10 years or more, full pay 26 weeks; half pay 26 weeks.
b. If the term of employment has been five to 10 years, full pay 13 weeks; half pay 13 weeks.
c. If the term of employment has been one to five years, full pay six weeks; half pay six weeks.

After an employee has received the maximum disability benefits, he shall not be eligible for further benefits on account of sickness until after 13 weeks of continuous duty.

There are several other features to the plan, such as old-age pension and group life insurance. These do not materially affect the statistical data contained herein.

The Medical Department was established soon after the disability benefit plan. The medical personnel consisted in a licensed M.D., a graduate nurse and a medical student for night emergency service. The staff has been added to, and now includes a nose and throat specialist, an internist, a surgeon, physiotherapist and dentist, with a consultant neurologist and orthopedist.

The work in the Department consisted in examination of new employees, care of insurance cases and minor medical needs that arose on the premises. At present, a general consultation clinic is held each week.

The medical staff was not equipped by experience, nor could they procure any medical experience rating, for the disability benefit plan adopted by *The Times*. A medical experience rating, such as that of the life insurance companies and the compensation insurance carriers would have served as a guide in the medical selection of applicants. Rules were necessary, but no one knew what they should be. The head of the Medical Department was familiar with the basic principles of life insurance and the importance of the physical examination rating. With this knowledge and a close study of the plan, there was formulated a set of arbitrary rules of physical requirements. These rules are still in force and no basic changes have been made in them nor in the disability benefit plan.

Medical records of the physical examination, subsequent visits and all absences due to sickness or injury were kept from the first year. No basic changes have been made in the form of the records kept. The data to be presented were obtained from a study of the medical charts.

The physical examination was similar to that required by life insurance companies. The examina-

tions were made, with a few exceptions, in *The Times'* Medical Department. There were two classes made with respect to employment—those that passed and those that did not. For purposes of purely medical interest, all individuals were divided into four groups: A, B, C and D. The first three were acceptable; the last, not acceptable. All the medical information and records were the property of the Medical Department and no rating other than "passed" or "D" (failed to pass) appeared on any personal card outside of the Medical Department.

The medical groups were:

A—Physically fit. No defects.

B—Physically fit. Defects of a minor nature, such as bad teeth, tonsils, etc., that could be easily eliminated to leave the individual in Class "A" standing. A follow-up has been conducted on these individuals.

C—Physically fit. Defects of a fixed nature, that in no way interfered with the expected longevity and usefulness of an employee, such as loss of a limb, one eye, healed fractures, etc.

D—Physically unfit. Defects that either decreased the normal life expectancy or interfered with the duties of the employee. Any history or sign of tuberculosis, ulcer, gall bladder disturbance; heart, kidney or mental disease.

In a few instances, individuals in the "D" group have been employed. These have furnished valuable information when their medical experience has been contrasted with that of individuals in other groups.

The mass of records has been condensed for study into as compact a form as possible. However, the presentation of the whole is impossible in a short space; but, for points of special interest, the details in the records have not been eliminated For instance, it is possible to estimate the liability of an employee with tonsils over one without; with hernia over one without. Likewise, the liability accepted in an employee with a history of frequent colds and hay fever can be estimated. These various factors have been studied to determine what the rules governing the selection of employees should be in the event of a change in benefit plan. The most important factor in such a study is to determine what the medical experience would be in the acceptance of all applicants for employment.

The material selected for presentation here illustrates factors of importance in medical selection of individuals under a special benefit plan and under the usual compensation insurance plan.

Major Chart A

Pages 619 to 626, Inclusive

IN THIS chart, the data are arranged to present the experience for 10 years. The 10 years are considered as one period; the year of 1931, another. The lost time is divided into that due to illness and that due to injuries. A further division is made for each group and the total of all groups; for the time lost, and the cost for each physical system. In the compilation of the data, the different diseases in each physical system were noted collectively. A chart representation of each disease for the different physical groups is now being prepared for a later report. This report will deal with the subject in an intensive medical way. The present chart serves mainly to represent the total cost over the 10-year period of conditions that arose in different physical systems.

Index of MAJOR CHART A.

[NOTE: Major chart A will be found on pages as follows:
ILLNESSES:
Upper respiratory (nose, throat, sinuses, etc.) 619
Eyes (inflammations, infections—) 619
Ear infections 619
Dental conditions 619
Thyroid 619
Neck (lymph nodes) 619
Grippe 619
LUNGS:
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Pneumonia 620
Pleurisy 620
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Tuberculosis 620
Heart 620
Aesophagus 620
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Liver and gall ducts 620
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Arthritis, neuritis, myositis 623
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Miscellaneous 623
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MISCELLANEOUS 626]

MAJOR CHART A

MEDICAL RATING	MAJOR CHART—A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		ILLNESSES: UPPER RESPIRATORY (NOSE, THROAT, SINUSES, ETC.)	EYES (INFLAMMATIONS, INFECTIONS,—)	EAR INFECTIONS	DENTAL CONDITIONS	THYROID	NECK (LYMPH NODES)	GRIPPE	LUNGS: BRONCHITIS
A	1921 Through 1930 493 Empl.	Number of Days Lost	1054	60	59	24	175	17	628	232
		Cost to The Times	$7,378.00	$ 420.00	$ 413.00	$ 168.00	$1,225.00	$ 119.00	$4,396.00	$1,624.00
	1931 568 Empl.	Number of Days Lost	218	13	51	21	0	0	440	19
		Cost to The Times	1,526.00	91.00	357.00	147.00	0	0	3,080.00	133.00
B	1921 Through 1930 855 Empl.	Number of Days Lost	2299	118	103	84	74	0	1417	426
		Cost to The Times	16,093.00	826.00	721.00	588.00	518.00	0	9,919.00	2,982.00
	1931 1028 Empl.	Number of Days Lost	546	19	26	5	0	0	814	69
		Cost to The Times	3,822.00	133.00	182.00	35.00	0	0	5,698.00	483.00
C	1921 Through 1930 377 Empl.	Number of Days Lost	837	40	71	47	7	10	645	134
		Cost to The Times	5,859.00	280.00	497.00	329.00	49.00	70.00	4,515.00	938.00
	1931 461 Empl.	Number of Days Lost	259	6	0	13	0	14	165	77
		Cost to The Times	1,813.00	42.00	0	31.00	0	38.00	1,155.00	539.00
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	3505	618	283	80	323	38	3565	1736
		Cost to The Times	24,535.00	4,326.00	1,981.00	560.00	2,261.00	266.00	2,495.00	12,152.00
	1931 836 Empl.	Number of Days Lost	212	172	60	23	115	15	746	294
		Cost to The Times	1,484.00	1,204.00	420.00	161.00	805.00	105.00	5,222.00	2,058.00
TOTAL	1921 Through 1930	Number of Days Lost	7695	836	516	235	579	65	6255	2528
		Cost to The Times	53,865.00	5,852.00	3,612.00	1,645.00	4,053.00	455.00	43,785.00	17,696.00
	1931	Number of Days Lost	1253	210	137	62	115	29	2165	459
		Cost to The Times	8,645.00	1,470.00	959.00	434.00	805.00	203.00	15,155.00	3,213.00
D	1921 Through 1930 38 Empl.	Number of Days Lost	6	0	7	0	5	0	88	148
		Cost to The Times	42.00	0	49.00	0	35.00	0	616.00	1,036.00
	1931 49 Empl.	Number of Days Lost	0	0	0	0	0	0	0	42
		Cost to The Times	0	0	0	0	0	0	56.00	294.00
GRAND TOTAL	1921 Through 1930	Number of Days Lost	7701	836	523	235	584	65	6343	2676
		Cost to The Times	53,907.00	5,852.00	3,661.00	1,645.00	4,088.00	455.00	44,401.00	18,732.00
	1931	Number of Days Lost	1235	210	137	62	115	29	2173	501
		Cost to The Times	8,645.00	1,470.00	959.00	434.00	805.00	203.00	15,211.00	3,507.00
Approx. Amount of Time Lost per Year in Ten Year survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	2369	257	167	72	179	20	1951	823
		Cost to The Times	16,583.00	1,799.00	1,169.00	504.00	1,253.00	140.00	13,657.00	5,761.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART—A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		ILLNESSES										
			LUNGS							ABDOMEN			
			PNEUMONIA	PLEURISY	ASTHMA	TUBERCULOSIS	HEART	AESOPHAGUS	G. I. TRACT (STOMACH, DUODENUM, COLON,—)	LIVER AND GALL DUCTS	APPENDIX
A	1921 Through 1930 493 Empl.	Number of Days Lost	126	35	0	368	0	0	209	74	352
		Cost to The Times	882.00	245.00	0	2,576.00		0	1,463.00	518.00	2,464.00
	1931 568 Empl.	Number of Days Lost	0	16	0	124	0	0	85	64	184
		Cost to The Times	0	112.00	0	868.00	0	0	595.00	448.00	1,288.00
B	1921 Through 1930 855 Empl.	Number of Days Lost	82	126	0	0	468	0	336	246	756
		Cost to The Times	574.00	882.00	0	0	3,276.00	0	2,352.00	1,722.00	5,292.00
	1931 1028 Empl.	Number of Days Lost	122	75	83	255	46	0	221	0	220
		Cost to The Times	854.00	525.00	581.00	1,785.00	322.00	0	1,547.00	0	1,540.00
C	1921 Through 1930 377 Empl.	Number of Days Lost	178	31	0	0	77	0	351	79	503
		Cost to The Times	1,246.00	217.00	0	0	539.00	0	2,457.00	553.00	3,521.00
	1931 461 Empl.	Number of Days Lost	0	46	0	140	91	0	67	18	82
		Cost to The Times	0	322.00	0	380.00	637.00	0	469.00	126.00	574.00
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	879	433	90	1389	1091	0	1167	740	1076
		Cost to The Times	6,153.00	3,031.00	630.00	9,723.00	7,637.00	0	8,169.00	5,180.00	7,532.00
	1931 836 Empl.	Number of Days Lost	250	12	0	365	277	0	430	41	83
		Cost to The Times	1,750.00	84.00	0	2,555.00	1,939.00	0	3,010.00	287.00	581.00
TOTAL	1921	Number of Days Lost	1265	625	90	1757	1636	0	2063	1139	2687
	1921 Through 1930	Cost to The Times	8,855.00	4,375.00	630.00	12,299.00	11,452.00	0	14,441.00	7,973.00	18,908.00
	1930	Number of Days Lost	372	149	83	884	414	0	803	123	569
	1931	Cost to The Times	2,604.00	1,043.00	581.00	6,188.00	2,898.00	0	5,621.00	861.00	3,983.00
D	1921 Through 1930 38 Empl. 1931 49 Empl.	Number of Days Lost	0	0	0	1095	168	0	7	0	98
		Cost to The Times	0	0	0	7,665.00	1,176.00	0	49.00	0	686.00
		Number of Days Lost	0	0	0	140	0	0	0	0	0
		Cost to The Times	0	0	0	980	0	0	0	0	0
GRAND TOTAL	1921 Through 1930	Number of Days Lost	1265	625	90	2852	1804	0	2070	1139	2785
		Cost to The Times	8,855.00	4,375.00	630.00	19,964.00	12,628.00	0	14,490.00	7,973.00	19,495.00
	1930	Number of Days Lost	372	149	83	1024	414	0	803	123	569
	1931	Cost to The Times	2,604.00	1,043.00	581.00	7,168.00	2,898.00	0	5,621.00	861.00	3,983.00
Approx. Amount of Time Lost per Year in Ten Year Survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	389	184	27	877	552	0	636	350	856
		Cost to The Times	2,713.00	1,288.00	189.00	6,139.00	3,864.00	0	4,452.00	2,450.00	5,992.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART—A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		ILLNESSES: ABDOMEN: RECTUM (FISTULA, HEMORRHOIDS, ETC.)	ABDOMEN: G. U. TRACT (KIDNEY, BLADDER, PROSTRATE, G.C.,—)	ABDOMEN: BUBONOCELE, VARICOCELE, HYDROCELE	ABDOMEN: FEMALE ORGANS	BACK: LUMBAGO	BACK: SACRO-COCCYGEAL	LOWER EXTREMITIES: OSTEOMYELITIS	LOWER EXTREMITIES: INFECTIONS
A	1921 Through 1930 493 Empl.	Number of Days Lost	145	134	0	26	0	0	0	4
		Cost to The Times	$1,015.00	$ 938.00	0	$ 182.00	0	0	0	$ 28.00
	1931 568 Empl.	Number of Days Lost	66	34	9	0	30	0	0	11
		Cost to The Times	462.00	238.00	63.00	0	210.00	0	0	77.00
B	1921 Through 1930 855 Empl.	Number of Days Lost	225	202	137	274	37	5	0	7
		Cost to The Times	1,575.00	1,414.00	959.00	1,918.00	259.00	35.00	0	49.00
	1931 1028 Empl.	Number of Days Lost	91	268	0	13	0	0	0	10
		Cost to The Times	637.00	1,876.00	0	91.00	0	0	0	70.00
C	1921 Through 1930 377 Empl.	Number of Days Lost	192	184	0	220	17	0	75	17
		Cost to The Times	1,344.00	1,288.00	0	1,540.00	119.00	0	525.00	119.00
	1931 461 Empl.	Number of Days Lost	33	0	0	8	0	0	0	12
		Cost to The Times	231.00	0	0	56.00	0	0	0	84.00
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	477	1315	43	55	373	0	467	262
		Cost to The Times	3,339.00	9,205.00	301.00	385.00	2,611.00	0	3,269.00	1,834.00
	1931 836 Empl.	Number of Days Lost	55	98	6	154	45	0	0	0
		Cost to The Times	385.00	686.00	42.00	1,078.00	315.00	0	0	0
TOTAL	1921 Through 1930	Number of Days Lost	1039	1835	180	575	427	5	542	290
		Cost to The Times	7,273.00	12,845.00	1,260.00	4,025.00	2,989.00	35.00	3,794.00	2030.00
	1931	Number of Days Lost	245	400	15	175	75	0	0	33
		Cost to The Times	1,715.00	2,800.00	105.00	1,225.00	525.00	0	0	231.00
D	1921 Through 1930 38 Empl.	Number of Days Lost	0	0	0	0	0	3	0	23
		Cost to The Times	0	0	0	0	0	21.00	0	161.00
	1931 49 Empl.	Number of Days Lost	0	0	0	0	0	0	0	0
		Cost to The Times	0	0	0	0	0	0	0	0
GRAND TOTAL	1921 Through 1930	Number of Days Lost	1039	1835	180	575	427	8	542	313
		Cost to The Times	7,273.00	12,845.00	1,260.00	4,025.00	2,989.00	56.00	3,794.00	2,191.00
	1931	Number of Days Lost	245	400	15	175	75	0	0	33
		Cost to The Times	1,715.00	2,800.00	105.00	1,225.00	525.00	0	0	231.00
Approx. Amount of Time Lost per Year in Ten Year survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	319	564	55	176	131	2	166	96
		Cost to The Times	2,233.00	3,948.00	385.00	1,232.00	917.00	14.00	1,162.00	672.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART—A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		ILLNESSES — LOWER EXTREMITIES — SCIATICA	FLAT FEET	INGROWN NAILS	VARICOSE VEINS	UPPER EXTREMITIES — OSTEOMYELITIS	INFECTIONS	GENERAL — SIGNS OF LUES	ARTERIO-SCLEROSIS
A	1921 Through 1930 493 Empl.	Number of Days Lost	0	0	15	42	0	7	3	0
		Cost to The Times	0	0	$ 105.00	$ 294.00	0	$ 49.00	$ 21.00	0
	1931 568 Empl.	Number of Days Lost	3	19	0	0	0	4	0	0
		Cost to The Times	21.00	133.00	0	0	0	28.00	0	0
B	1921 Through 1930 855 Empl.	Number of Days Lost	283	21	6	32	21	118	82	0
		Cost to The Times	1,981.00	147.00	42.00	224.00	147.00	826.00	574.00	0
	1931 1028 Empl.	Number of Days Lost	59	60	0	4	41	12	0	0
		Cost to The Times	413.00	420.00	0	28.00	287.00	84.00	0	0
C	1921 Through 1930 377 Empl.	Number of Days Lost	91	5	6	0	0	68	0	0
		Cost to The Times	637.00	35.00	42.00	0	0	476.00	0	0
	1931 461 Empl.	Number of Days Lost	39	0	0	0	0	4	0	0
		Cost to The Times	273.00	0	0	0	0	28.00	0	0
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	213	180	18	98	31	459	390	132
		Cost to The Times	1,491.00	1,260.00	126.00	686.00	217.00	3,213.00	2,730.00	924.00
	1931 836 Empl.	Number of Days Lost	0	0	0	4	0	424	466	198
		Cost to The Times	0	0	0	28.00	0	2,968.00	3,262.00	1,386.00
TOTAL	1921 Through 1930	Number of Days Lost	587	206	45	172	52	652	475	132
		Cost to The Times	4,109.00	1,442.00	315.00	1,204.00	364.00	4,564.00	3,325.00	924.00
	1931	Number of Days Lost	101	79	0	8	41	444	466	198
		Cost to The Times	707.00	553.00	0	56.00	287.00	3,108.00	3,262.00	1,386.00
D	1921 Through 1930 38 Empl.	Number of Days Lost	0	0	0	0	0	0	0	0
		Cost to The Times	0	0	0	0	0	0	0	0
	1931 49 Empl.	Number of Days Lost	0	0	0	0	0	0	0	0
		Cost to The Times	0	0	0	0	0	0	0	0
GRAND TOTAL	1921 Through 1930	Number of Days Lost	587	206	45	172	52	652	475	132
		Cost to The Times	4,109.00	1,442.00	315.00	1,204.00	364.00	4,564.00	3,325.00	924.00
	1931	Number of Days Lost	101	79	0	8	41	444	466	198
		Cost to The Times	707.00	553.00	0	56.00	287.00	3,108.00	3,262.00	1,386.00
Approx. Amount of Time Lost per Year in Ten Year Survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	180	63	13	53	16	100	146	40
		Cost to The Times	1,260.00	441.00	91.00	371.00	112.00	700.00	1,022.00	280.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART—A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		ILLNESSES — GENERAL: HYPERTENSION	NERVOUS AND MENTAL DISORDERS	SKIN DISEASES	RHEUMATISM	ARTHRITIS, NEURITIS, MYOSITIS	ASTHENIA	FURUNCLES, CARBUNCLES, ABSCESSES, ETC.	MISCELLANEOUS
A	1921 Through 1930 493 Empl.	Number of Days Lost	0	3	34	24	81	44	16	68
		Cost to The Times	0	21.00	238.00	168.00	567.00	308.00	112.00	476.00
	1931 568 Empl.	Number of Days Lost	0	86	5	20	4	6	6	84
		Cost to The Times	0	602.00	35.00	140.00	28.00	42.00	42.00	588.00
B	1921 Through 1930 855 Empl.	Number of Days Lost	14	116	153	359	257	286	21	261
		Cost to The Times	98.00	812.00	1,071.00	2,513.00	1,799.00	2,002.00	147.00	1,827.00
	1931 1028 Empl.	Number of Days Lost	0	77	108	31	27	67	88	206
		Cost to The Times	0	539.00	756.00	217.00	189.00	469.00	616.00	1,442.00
C	1921 Through 1930 377 Empl.	Number of Days Lost	0	45	64	34	47	195	99	373
		Cost to The Times	0	315.00	448.00	238.00	329.00	1,365.00	693.00	2,611.00
	1931 461 Empl.	Number of Days Lost	0	28	104	33	29	0	60	63
		Cost to The Times	0	196.00	728.00	231.00	203.00	0	420.00	441.00
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	465	1442	207	1347	1878	960	220	2694
		Cost to The Times	3,255.00	10,094.00	1,449.00	9,429.00	13,146.00	6,720.00	1,540.00	18,858.00
	1931 836 Empl.	Number of Days Lost	10	726	68	76	269	42	106	750
		Cost to The Times	70.00	5,082.00	476.00	532.00	1,882.00	294.00	742.00	5,250.00
TOTAL	1921 Through 1930	Number of Days Lost	479	1606	458	1764	2263	1485	356	3396
		Cost to The Times	3,353.00	11,242.00	3,206.00	12,348.00	15,841.00	10,395.00	2,492.00	23,772.00
	1931	Number of Days Lost	10	917	285	160	329	115	260	1103
		Cost to The Times	70.00	6,419.00	1,995.00	1,120.00	2,303.00	805.00	1,820.00	7,721.00
D	1921 Through 1930 38 Empl.	Number of Days Lost	35	0	0	0	0	0	10	17
		Cost to The Times	245.00	0	0	0	0	0	70.00	119.00
	1931 49 Empl.	Number of Days Lost	0	0	0	72	0	6	0	320
		Cost to The Times	0	0	0	504.00	0	42.00	0	2,240.00
GRAND TOTAL	1921 Through 1930	Number of Days Lost	489	1606	458	1764	2263	1485	366	3413
		Cost to The Times	3,423.00	11,242.00	3,206.00	12,348.00	15,841.00	10,395.00	2,562.00	23,891.00
	1931	Number of Days Lost	10	917	285	232	329	121	260	1423
		Cost to The Times	70.00	6,419.00	1,895.00	1,624.00	2,303.00	847.00	1,820.00	9,961.00
Approx. Amount of Time Lost per Year in Ten Year survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	15	494	141	542	696	456	112	1050
		Cost to The Times	105.00	3,458.00	987.00	3,794.00	4,872.00	3,192.00	784.00	7,370.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART A — AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		INJURIES							
			EYES	SKULL		NECK	THORAX		HERNIA	BACK
			LACERATIONS CORNEAL ULCERS	FRACTURES	CONCUSSIONS,—	LACERATIONS, SPRAINS, ETC.	FRACTURES	INJURIES	INGUINAL SCROTAL UMBILICAL, ETC.	SPRAINS
	1921 Through	Number of Days Lost	162	70	49	7	0	41	112	246
A	1930 493 Empl.	Cost to The Times	1,134.00	490.00	343.00	49.00	0	287.00	784.00	1,722.00
	1931	Number of Days Lost	31	0	0	14	36	7	0	10
	568 Empl.	Cost to The Times	217.00	0	0	98.00	252.00	49.00	0	70.00
	1921 Through	Number of Days Lost	143	8	4	66	51	0	488	438
B	1930 855 Empl.	Cost to The Times	1,001.00	56.00	28.00	462.00	357.00	0	3,416.00	3,056.00
	1931	Number of Days Lost	47	0	10	0	7	31	130	68
	1028 Empl.	Cost to The Times	329.00	0	70.00	0	49.00	217.00	910.00	476.00
	1921 Through	Number of Days Lost	15	0	0	47	0	112	327	223
C	1930 377 Empl.	Cost to The Times	105.00	0	0	329.00	0	784.00	2,289.00	1,561.00
	1931	Number of Days Lost	0	0	13	0	0	0	203	25
	461 Empl.	Cost to The Times	0	0	91.00	0	0	0	1,421.00	175.00
	1921 Through	Number of Days Lost	245	82	103	15	0	405	1215	1398
NO PX	1930 785 Empl.	Cost to The Times	1,715.00	574.00	721.00	105.00	0	2,835.00	8,505.00	9,786.00
	1931	Number of Days Lost	0	0	0	0	176	15	39	265
	836 Empl.	Cost to The Times	0	0	0	0	1,232.00	105.00	273.00	1,855.00
	1921 Through	Number of Days Lost	565	160	156	135	51	558	2142	2305
TOTAL	1930	Cost to The Times	3,955.00	1,120.00	1,092.00	945.00	357.00	3,906.00	14,994.00	16,135.00
	1931	Number of Days Lost	78	0	23	14	219	53	372	368
		Cost to The Times	546.00	0	161.00	98.00	1,533.00	371.00	2,604.00	2,576.00
	1921 Through	Number of Days Lost	7	0	0	0	0	3	0	0
	1930 38 Empl.	Cost to The Times	49.00	0	0	0	0	21.00	0	0
D	1931	Number of Days Lost	0	0	0	0	8	0	0	7
	49 Empl.	Cost to The Times	0	0	0	0	56.00	0	0	49.00
	1921 Through	Number of Days Lost	643	160	156	135	51	561	2142	2305
GRAND TOTAL	1930	Cost to The Times	4,501.00	1,120.00	1,092.00	945.00	357.00	3,927.00	14,994.00	16,135.00
	1931	Number of Days Lost	78	0	23	14	227	53	372	375
		Cost to The Times	546.00	0	161.00	98.00	1,589.00	371.00	2,604.00	2,625.00
Approx. Amount of Time Lost per Year in Ten Year Survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	197	49	48	41	15	172	659	709
		Cost to The Times	1,379.00	343.00	336.00	287.00	105.00	1,204.00	4,613.00	4,963.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART—A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		INJURIES — LOWER EXTREMITIES — ANKLE: SPRAINS, FRACTURES,—	FOOT AND TOES: INJURIES	FOOT AND TOES: FRACTURES	FEMUR: CONTUSIONS, LACERATIONS,—	FEMUR: FRACTURES	TIBIA AND FIBULA: CONTUSIONS, LACERATIONS,—	TIBIA AND FIBULA: FRACTURES	PATELLA: CONTUSIONS, ABRASIONS,—
A	1921 Through 1930 493 Empl.	Number of Days Lost	99	113	115	0	0	40	0	106
		Cost to The Times	693.00	791.00	805.00	0	0	280.00	0	742.00
	1931 568 Empl.	Number of Days Lost	16	58	13	0	0	38	0	0
		Cost to The Times	112.00	406.00	91.00	0	0	266.00	0	0
B	1921 Through 1930 855 Empl.	Number of Days Lost	288	253	141	0	0	231	0	212
		Cost to The Times	2,016.00	1,771.00	987.00	0	0	1,617.00	0	1,484.00
	1931 1028 Empl.	Number of Days Lost	12	5	0	0	0	20	0	8
		Cost to The Times	84.00	35.00	0	0	0	140.00	0	56.00
C	1921 Through 1930 377 Empl.	Number of Days Lost	77	92	151	0	0	129	0	42
		Cost to The Times	539.00	644.00	1,057.00	0	0	903.00	0	294.00
	1931 461 Empl.	Number of Days Lost	22	24	9	48	72	7	0	84
		Cost to The Times	154.00	168.00	62.00	336.00	504.00	49.00	0	588.00
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	876	526	469	78	0	283	534	304
		Cost to The Times	6,132.00	3,682.00	3,283.00	546.00	0	1,981.00	3,738.00	2,128.00
	1931 836 Empl.	Number of Days Lost	18	10	14	17	0	31	0	21
		Cost to The Times	126.00	70.00	98.00	119.00	0	217.00	0	147.00
TOTAL	1921 Through 1930	Number of Days Lost	1340	984	876	78	0	683	534	664
		Cost to The Times	9,380.00	6,888.00	6,132.00	546.00	0	4,781.00	3,738.00	4,648.00
	1931	Number of Days Lost	68	97	36	65	72	96	0	113
		Cost to The Times	476.00	679.00	252.00	455.00	504.00	672.00	0	791.00
D	1921 Through 1930 38 Empl.	Number of Days Lost	0	3	92	0	0	2	0	0
		Cost to The Times	0	21.00	644.00	0	0	14.00	0	0
	1931 49 Empl.	Number of Days Lost	0	0	0	0	0	0	0	0
		Cost to The Times	0	0	0	0	0	0	0	0
GRAND TOTAL	1921 Through 1930	Number of Days Lost	1340	987	968	78	0	685	534	664
		Cost to The Times	9,380.00	6,909.00	6,776.00	546.00	0	4,795.00	3,738.00	4,648.00
	1931	Number of Days Lost	68	97	92	65	72	96	0	113
		Cost to The Times	476.00	679.00	644.00	455.00	504.00	672.00	0	791.00
Approx. Amount of Time Lost per Year in Ten Year survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	412	303	297	24	0	210	164	204
		Cost to The Times	2,884.00	2,121.00	2,079.00	168.00	0	1,470.00	1,148.00	1,428.00

MAJOR CHART A

MEDICAL RATING	MAJOR CHART A— AVERAGE LENGTH OF EMPLOYMENT PER MAN IN TEN YEAR SURVEY— 3¼ YEARS		INJURIES: LOW. EXTR. PATELLA FRACTURES	UPPER EXTREMITIES: HUMERUS CONTUSIONS, LACERATIONS,—	HUMERUS FRACTURES	FOREARM AND RADIUS CONTUSIONS, LACERATIONS,—	FOREARM AND RADIUS FRACTURES	FINGERS AND HANDS CONTUSIONS, LACERATIONS,—	FINGERS AND HANDS FRACTURES	MISCELLANEOUS
A	1921 Through 1930 493 Empl.	Number of Days Lost	0	124	0	0	0	368	17	401
		Cost to The Times	0	868.00	0	0	0	2,576.00	119.00	2,807.00
	1931 568 Empl.	Number of Days Lost	26	0	10	12	0	30	6	34
		Cost to The Times	182.00	0	70.00	84.00	0	210.00	42.00	238.00
B	1921 Through 1930 855 Empl.	Number of Days Lost	0	93	49	31	0	731	382	146
		Cost to The Times	0	651.00	343.00	217.00	0	5,117.00	2,674.00	1,022.00
	1931 1028 Empl.	Number of Days Lost	46	12	0	6	37	201	60	150
		Cost to The Times	322.00	84.00	0	42.00	259.00	1,407.00	420.00	1,050.00
C	1921 Through 1930 377 Empl.	Number of Days Lost	60	250	0	0	0	435	35	122
		Cost to The Times	420.00	1,750.00	0	0	0	3,045.00	245.00	854.00
	1931 461 Empl.	Number of Days Lost	0	0	50	0	0	37	93	50
		Cost to The Times	0	0	350.00	0	0	259.00	651.00	350.00
NO PX	1921 Through 1930 785 Empl.	Number of Days Lost	304	651	213	0	0	1348	468	1185
		Cost to The Times	2,128.00	4,557.00	1,491.00	0	0	9,436.00	3,276.00	8,295.00
	1931 836 Empl.	Number of Days Lost	0	30	0	0	115	242	88	257
		Cost to The Times	0	210.00	0	0	805.00	1,694.00	616.00	1,799.00
TOTAL	1921 Through 1930	Number of Days Lost	364	1118	262	31	0	2882	902	1854
		Cost to The Times	2,548.00	7,826.00	1,834.00	217.00	0	20,174.00	6,314.00	12,978.00
	1931	Number of Days Lost	72	42	60	18	152	510	247	491
		Cost to The Times	504.00	294.00	420.00	126.00	1,064.00	3,570.00	1,729.00	3,437.00
D	1921 Through 1930 38 Empl.	Number of Days Lost	0	134	0	0	0	56	0	15
		Cost to The Times	0	938.00	0	0	0	392.00	0	105.00
	1931 49 Empl.	Number of Days Lost	0	62	0	0	0	6	0	7
		Cost to The Times	0	434.00	0	0	0	42.00	0	49.00
GRAND TOTAL	1921 Through 1930	Number of Days Lost	364	1254	262	31	0	2938	902	1869
		Cost to The Times	2,548.00	8,764.00	1,834.00	217.00	0	20,566.00	6,314.00	13,083.00
	1931	Number of Days Lost	72	104	60	18	152	516	247	498
		Cost to The Times	504.00	728.00	420.00	126.00	1,064.00	3,612.00	1,729.00	3,486.00
Approx. Amount of Time Lost per Year in Ten Year Survey. Considering 3¼ Yrs. the Average Length of Employment per Man		Number of Days Lost	112	385	80	9	0	904	277	575
		Cost to The Times	784.00	2,695.00	560.00	63.00	0	6,328.00	1,939.00	4,025.00

Major Chart B

Pages 628 to 635, Inclusive

A PLAN for 1931 and 1932 that is similar to the major chart "A." A contrast of the first 10-year period, eleventh and twelfth year may be seen by a study of the two charts. Conditions arising in the different physical groups vary considerably. The variations can be accounted for by variations in the incidence of epidemics, such as colds and influenza. Other variations due to changes in the economic situation materially affect the yearly experience—primarily with respect to finances; and, secondarily, due to such conditions as angina. For instance, the effect of the depression: In 1931 the miscellaneous total—made up of absences due to minor ills that, in many instances, could not be classified—was at a cost of $9961. In 1932, the bottom of the depression, the miscellaneous total was less than half—a cost of $4039. The secondary physical effect is well shown in the heart column. In 1931, the total was $2898; in 1932, more than double —$6384. In a study of the medical charts now being prepared, there occur many interesting yearly differences. The cause for variations suggests itself in almost every instance.

Index of MAJOR CHART B.

[NOTE: Major chart B will be found on pages as follows:

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Major Chart C

Page 636

A REPRESENTATION of the contrast in the total cost of each medical group for the 10-year period. A division is made in the lost time that was due to illness and to accident. A study of this chart reveals the differences in the groups without respect to any physical system or disease. The general rules for acceptance for employment control these figures more than any disease factor.

In the columns showing the number of employees that lost time and those that did not, in the first three groups "A," "B" and "C," "B" shows the highest individual percentage time loss. This is due to the number in this group with conditions such as bad teeth and tonsils that were corrected during the medical follow-up of this group. In group "D," there occurred the smallest individual percentage time loss. This, no doubt, is due to non-participation in the benefit plan of this group. The highest individual percentage in this column is in the No Px group, due to the fact that each individual in the group averaged nine years of employment, thereby doubling the chance of having to lose time.

The time lost due to pre-existing causes in the four groups that were examined is due to causes that were noted and recorded at the time of the entrance physical examination. It is interesting to know that a routine physical examination is as accurate as these figures reveal. For three and one-half years, 493 men in group "A" lost only 10 days due to conditions noted at the time of examination that were not thought to be a cause for losing time. Group "B" lost a relatively large amount of time due to pre-existing causes. This was expected, and insistence upon the follow-up for the correction of these defects placed the applicant in the "A" group when they were cleared up. In Group "D," the medical prediction that the individuals in this group would lose a greater amount of time due to their pre-existing causes is borne out by the fact that 38 men, working 4¼ years, lost 1144 days. Con-

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		ILLNESSES: UPPER RESPIRATORY (NOSE, THROAT, SINUSES, ETC.)	EYES (INFLAMMATIONS, INFECTIONS, ETC.)	EAR INFECTIONS	DENTAL CONDITIONS	THYROID	NECK (LYMPH NODES)	GRIPPE	LUNGS: BRONCHITIS
A	1931	Number of Days Lost	218	13	51	21	0	0	440	19
	568 Empl.	Cost to The Times	1,526.00	91.00	357.00	147.00	0	0	3,080.00	133.00
	1932	Number of Days Lost	203	0	52	0	9	0	341	23
	521 Empl.	Cost to The Times	1,421.00	0	364.00	0	63.00	0	2,387.00	161.00
B	1931	Number of Days Lost	546	19	26	5	0	0	814	69
	1028 Empl.	Cost to The Times	3,822.00	133.00	182.00	35.00	0	0	5,698.00	483.00
	1932	Number of Days Lost	420	62	28	7	150	12	773	171
	1024 Empl.	Cost to The Times	2,940.00	434.00	196.00	49.00	1,050.00	84.00	5,411.00	1,197.00
C	1931	Number of Days Lost	259	6	0	13	0	14	165	77
	461 Empl.	Cost to The Times	1,813.00	42.00	0	91.00	0	98.00	1,155.00	539.00
	1932	Number of Days Lost	104	81	8	0	0	14	265	12
	468 Empl.	Cost to The Times	728.00	567.00	56.00	0	0	98.00	1,855.00	84.00
NO PX	1931	Number of Days Lost	212	172	60	23	115	15	746	294
	836 Empl.	Cost to The Times	1,484.00	1,204.00	420.00	161.00	805.00	105.00	5,222.00	2,058.00
	1932	Number of Days Lost	308	62	0	0	32	8	544	86
	919 Empl.	Cost to The Times	2,156.00	434.00	0	0	224.00	56.00	3,808.00	602.00
TOTAL	1931	Number of Days Lost	1253	210	137	62	115	29	2165	459
		Cost to The Times	8,645.00	147.00	959.00	434.00	805.00	203.00	15,155.00	3,213.00
	1932	Number of Days Lost	1035	205	88	7	191	34	1923	292
		Cost to The Times	7,245.00	1,435.00	616.00	49.00	1,337.00	238.00	13,461.00	2,044.00
D	1931	Number of Days Lost	0	0	0	0	0	0	8	42
	49 Empl.	Cost to The Times	0	0	0	0	0	0	56.00	294.00
	1932	Number of Days Lost	0	0	20	0	0	0	0	0
	60 Empl.	Cost to The Times	0	0	140.00	0	0	0	0	0
GRAND TOTAL	1931	Number of Days Lost	1235	210	137	62	115	29	2173	501
		Cost to The Times	8,645.00	1,470.00	959.00	434.00	805.00	203.00	15,211.00	3,507.00
	1932	Number of Days Lost	1035	205	108	7	191	34	1923	292
		Cost to The Times	7,245.00	1,435.00	756.00	49.00	1,337.00	238.00	13,461.00	2,044.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		ILLNESSES: LUNGS: PNEUMONIA	LUNGS: PLEURISY	LUNGS: ASTHMA	LUNGS: TUBERCULOSIS	HEART	AESOPHAGUS	ABDOMEN: G. I. TRACT (STOMACH, DUODENUM, COLON,—)	ABDOMEN: LIVER AND GALL DUCTS	ABDOMEN: APPENDIX
A	1931	Number of Days Lost	0	16	0	124	0	0	85	64	184
	568 Empl.	Cost to The Times	0	112.00	0	868.00	0	0	595.00	448.00	1,288.00
	1932	Number of Days Lost	14	21	0	72	0	0	14	0	54
	521 Empl.	Cost to The Times	98.00	147.00	0	504.00	0	0	98.00	0	378.00
B	1931	Number of Days Lost	122	75	83	255	46	0	221	0	220
	1028 Empl.	Cost to The Times	854.00	525.00	581.00	1,785.00	322.00	0	1,547.00	0	1,540.00
	1932	Number of Days Lost	186	139	0	72	124	0	124	112	296
	1024 Empl.	Cost to The Times	1,302.00	973.00	0	504.00	868.00	0	868.00	784.00	2,072.00
C	1931	Number of Days Lost	0	46	0	140	91	0	67	18	82
	461 Empl.	Cost to The Times	0	322.00	0	980.00	637.00	0	469.00	126.00	574.00
	1932	Number of Days Lost	16	89	0	12	147	0	72	5	56
	468 Empl.	Cost to The Times	112.00	623.00	0	84.00	1,029.00	0	504.00	35	392.00
NO PX	1931	Number of Days Lost	250	12	0	365	277	0	430	41	83
	836 Empl.	Cost to The Times	1,750.00	84.00	0	2,555.00	1,939.00	0 0	3,010.00	287.00	581.00
	1932	Number of Days Lost	221	0	0	819	641	0	265	64	0
	919 Empl.	Cost to The Times	1,547.00	0	0	5,735.00	4,487.00	0 0	1,855.00	448.00	0
TOTAL	1931	Number of Days Lost	372	149	83	884	414	0	803	123	569
		Cost to The Times	2,604.00	1,043.00	581.00	6,188.00	2,898.00	0	5,621.00	861.00	3,983.00
	1932	Number of Days Lost	437	249	0	975	912	0	475	181	406
		Cost to The Times	3,059.00	1,743.00	0	6,825.00	6,384.00	0	3,325.00	1,267.00	2,842.00
D	1931	Number of Days Lost	0	0	0	140	0	0	0	0	0
	49 Empl.	Cost to The Times	0	0	0	980.00	0	0	0	0	0
	1932	Number of Days Lost	0	0	0	407	0	0	0	0	30
	60 Empl.	Cost to The Times	0	0	0	2,849.00	0	0	0	0	210.00
GRAND TOTAL	1931	Number of Days Lost	372	149	83	1024	414	0	803	123	569
		Cost to The Times	2,604.00	1,043.00	581.00	7,168.00	2,898.00	0	5,621.00	861.00	3,983.00
	1932	Number of Days Lost	437	249	0	1382	912	0	475	181	436
		Cost to The Times	3,059.00	1,743.00	0	9,674.00	6,384.00	0	3,325.00	1,267.00	3,052.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART B — AVERAGE SALARY — $7.00 PER DAY		ILLNESSES								
			ABDOMEN				BACK			LOWER EXTREMITIES	
			RECTUM (FISTULA, HEMORRHOIDS, ETC.)	G. U. TRACT (KIDNEY, BLADDER, PROSTRATE, G.C.,—)	BUBONOCELE, VARICOCELE, HYDROCELE	FEMALE ORGANS	LUMBAGO	SACRO-COCCYGEAL	OSTEOMYELITIS	INFECTIONS
A	1931	Number of Days Lost	66	34	9	0	30	0	0	11
	568 Empl.	Cost to The Times	462.00	238.00	63.00	0	210.00	0	0	77.00
	1932	Number of Days Lost	24	7	0	18	6	0	0	42
	521 Empl.	Cost to The Times	168.00	49.00	0	126.00	42.00	0	0	294.00
B	1931	Number of Days Lost	91	268	0	13	0	0	0	10
	1028 Empl.	Cost to The Times	637.00	1,876.00	0	91.00	0	0	0	70.00
	1932	Number of Days Lost	122	46	0	117	19	0	0	7
	1024 Empl.	Cost to The Times	954.00	322.00	0	819.00	133.00	0	0	49.00
C	1931	Number of Days Lost	33	0	0	8	0	0	0	12
	461 Empl.	Cost to The Times	231.00	0	0	56.00	0	0	0	84.00
	1932	Number of Days Lost	0	25	0	15	0	0	0	44
	468 Empl.	Cost to The Times	0	175.00	0	105.00	0	0	0	308.00
NO PX	1931	Number of Days Lost	55	98	6	154	45	0	0	0
	836 Empl.	Cost to The Times	385.00	686.00	42.00	1,078.00	315.00	0	0	0
	1932	Number of Days Lost	59	101	0	121	5	0	0	0
	919 Empl.	Cost to The Times	413.00	707.00	0	847.00	35.00	0	0	0
TOTAL	1931	Number of Days Lost	245	400	15	175	75	0	0	33
		Cost to The Times	1,715.00	2,800.00	105.00	1,225.00	525.00	0	0	231.00
	1932	Number of Days Lost	205	179	0	271	30	0	0	93
		Cost to The Times	1,435.00	1,253.00	0	1,897.00	210.00	0	0	651.00
D	1931	Number of Days Lost	0	0	0	0	0	0	0	0
	49 Empl.	Cost to The Times	0	0	0	0	0	0	0	0
	1932	Number of Days Lost	0	0	0	0	0	0	0	0
	60 Empl.	Cost to The Times	0	0	0	0	0	0	0	0
GRAND TOTAL	1931	Number of Days Lost	245	400	15	175	75	0	0	33
		Cost to The Times	1,715.00	2,800.00	105.00	1,225.00	525.00	0	0	231.00
	1932	Number of Days Lost	205	179	0	271	30	0	0	93
		Cost to The Times	1,435.00	1,253.00	0	1,897.00	210.00	0	0	651.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		ILLNESSES									
			LOWER EXTREMITIES					UPPER EXTREMITIES		GENERAL		
			SCIATICA	FLAT FEET	INGROWN NAILS	VARICOSE VEINS	OSTEOMYELITIS	INFECTIONS	SIGNS OF LUES	ARTERIO-SCLEROSIS
A	1931	Number of Days Lost	3	19	0	0	0	4	0	0
	568 Empl.	Cost to The Times	21.00	133.00	0	0	0	28.00	0	0
	1932	Number of Days Lost	36	0	0	0	0	0	59	0
	521 Empl.	Cost to The Times	252.00	0	0	0	0	0	413.00	0
B	1931	Number of Days Lost	59	60	0	4	41	12	0	0
	1028 Empl.	Cost to The Times	413.00	420.00	0	28.00	28.00	84.00	0	0
	1932	Number of Days Lost	194	0	0	4	0	0	0	0
	1024 Empl.	Cost to The Times	1,358.00	0	0	28.00	0	0	0	-
C	1931	Number of Days Lost	39	0	0	0	0	4	0	0
	461 Empl.	Cost to The Times	273.00	0	0	0	0	28.00	0	0
	1932	Number of Days Lost	5	0	0	0	0	0	0	72
	468 Empl.	Cost to The Times	35.00	0	0	0	0	0	0	504.00
NO PX	1931	Number of Days Lost	0	0	0	4	0	424	466	198
	836 Empl.	Cost to The Times	0	0	0	28.00	0	2,968.00	3,262.00	1,386.00
	1932	Number of Days Lost	0	0	0	0	0	0	354	62
	919 Empl.	Cost to The Times	0	0	0	0	0	0	2,478.00	434.00
TOTAL	1931	Number of Days Lost	101	79	0	8	41	444	466	198
		Cost to The Times	707.00	553.00	0	56.00	287.00	3,108.00	3,262.00	1,386.00
	1932	Number of Days Lost	235	0	0	4	0	0	413	134
		Cost to The Times	1,645.00	0	0	28.00	0	0	2,891.00	938.00
D	1931	Number of Days Lost	0	0	0	0	0	0	0	0
	49 Empl.	Cost to The Times	0	0	0	0	0	0	0	0
	1932	Number of Days Lost	0	0	0	0	0	0	0	0
	60 Empl.	Cost to The Times	0	0	0	0	0	0	0	0
GRAND TOTAL	1931	Number of Days Lost	101	79	0	8	41	444	466	198
		Cost to The Times	707.00	553.00	0	56.00	287.00	3,108.00	3,262.00	1,386.00
	1932	Number of Days Lost	235	0	0	4	0	0	413	134
		Cost to The Times	1,645.00	0	0	28.00	0	0	2,891.00	938.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		ILLNESSES — GENERAL — HYPERTENSION	NERVOUS AND MENTAL DISORDERS	SKIN DISEASES	RHEUMATISM	ARTHRITIS, NEURITIS, MYOSITIS	ASTHENIA	FURNUCLES, CARBUNCLES, ABSCESSES, ETC.	MISCELLANEOUS
A	1931	Number of Days Lost	0	86	5	20	4	6	6	84
	568 Empl.	Cost to The Times	0	602.00	35.00	140.00	28.00	42.00	42.00	588.00
	1932	Number of Days Lost	0	171	13	21	51	24	0	9
	521 Empl.	Cost to The Times		1,197.00	91.00	147.00	357.00	168.00	0	63.00
B	1931	Number of Days Lost	0	77	108	31	27	67	88	206
	1028 Empl.	Cost to The Times	0	539.00	756.00	217.00	189.00	469.00	616.00	1,442.00
	1932	Number of Days Lost	0	67	0	182	75	0	13	98
	1024 Empl.	Cost to The Times	0	469.00	0	1,274.00	525.00	0	91.00	686.00
C	1931	Number of Days Lost	0	28	104	33	29	0	60	63
	461 Empl.	Cost to The Times	0	196.00	728.00	231.00	203.00	0	420.00	441.00
	1932	Number of Days Lost	0	5	27	0	15	55	0	210
	468 Empl.	Cost to The Times	0	35.00	189.00	0	105.00	385.00	0	1,470.00
NO PX	1931	Number of Days Lost	10	720	68	76	269	42	106	750
	836 Empl.	Cost to The Times	70.00	5,082.00	476.00	532.00	1,883.00	294.00	742.00	5,250.00
	1932	Number of Days Lost	0	176	23	17	342	12	130	218
	919 Empl.	Cost to The Times	0	1,232	161	119	2,394	84	910	1,526
TOTAL	1931	Number of Days Lost	10	917	285	160	329	115	260	1103
		Cost to The Times	70.00	6,419.00	1,995.00	1,120.00	2,303.00	805.00	1,820.00	7,721.00
	1932	Number of Days Lost	0	49	63	220	483	91	143	535
		Cost to The Times	0	2,933.00	441.00	1,540.00	3,381.00	637.00	1,001.00	3,745.00
D	1931	Number of Days Lost	0	0	0	72	0	6	0	320
	49 Empl.	Cost to The Times	0	0	0	504.00	0	42.00	0	2,240.00
	1932	Number of Days Lost	0	0	0	8	0	0	0	42
	60 Empl.	Cost to The Times	0	0	0	56.00	0	0	0	294.00
GRAND TOTAL	1931	Number of Days Lost	10	917	285	232	329	121	260	1423
		Cost to The Times	70.00	6,419.00	1,995.00	1,624.00	2,303.00	847.00	1,820.00	9,961.00
	1932	Number of Days Lost	0	419	63	228	483	91	143	577
		Cost to The Times	0	2,933.00	441.00	1,596.00	3,381.00	637.00	1,001.00	4,039.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		INJURIES: EYES — LACERATIONS CORNEAL ULCERS	SKULL — FRACTURES	SKULL — CONCUSSIONS,—	NECK — LACERATIONS, SPRAINS, ETC.	THORAX — FRACTURES	THORAX — INJURIES	HERNIA — INGUINAL SCROTAL UMBILICAL, ETC.	BACK — SPRAINS
A	1931	Number of Days Lost	31	0	0	14	36	7	0	10
	568 Empl.	Cost to The Times	217.00	0	0	98.00	252.00	49.00	0	70.00
	1932	Number of Days Lost	48	0	0	0	12	12	122	10
	521 Empl.	Cost to The Times	336.00	0	0	0	84.00	84.00	854.00	70.00
B	1931	Number of Days Lost	47	0	10	0	7	31	130	68
	1028 Empl.	Cost to The Times	329	0	70.00	0	49.00	217.00	910.00	476.00
	1932	Number of Days Lost	128	0	0	0	100	0	122	57
	1024 Empl.	Cost to The Times	896.00	0	0	0	700.00	0	854.00	399.00
C	1931	Number of Days Lost	0	0	13	0	0	0	203	25
	461 Empl.	Cost to The Times	0	0	91.00	0	0	0	1,421.00	175.00
	1932	Number of Days Lost	8	0	0	21	0	0	57	31
	468 Empl.	Cost to The Times	56.00	0	0	147.00	0	0	399.00	217.00
NO PX	1931	Number of Days Lost	0	0	0	0	176	15	39	265
	836 Empl.	Cost to The Times	0	0	0	0	1,232.00	105.00	273.00	1,855.00
	1932	Number of Days Lost	24	55	0	0	102	79	224	94
	919 Empl.	Cost to The Times	168.00	385.00	0	0	714.00	539.00	1,568.00	658.00
TOTAL	1931	Number of Days Lost	78	0	23	14	219	53	372	368
		Cost to The Times	546.00	0	161.00	98.00	1,533.00	371.00	2,604.00	2,576.00
	1932	Number of Days Lost	208	55	0	21	214	89	525	192
		Cost to The Times	1,456.00	385.00	0	147.00	1,498.00	623.00	3,675.00	1,344.00
D	1931	Number of Days Lost	0	0	0	0	8	0	0	7
	49 Empl.	Cost to The Times	0	0	0	0	56.00	0	0	49.00
	1932	Number of Days Lost	0	0	0	0	12	0	0	0
	60 Empl.	Cost to The Times	0	0	0	0	84	0	0	0
GRAND TOTAL	1931	Number of Days Lost	78	0	23	14	227	53	372	375
		Cost to The Times	546.00	0	161.00	98.00	1,589.00	371.00	2,604.00	2,625.00
	1932	Number of Days Lost	208	55	0	21	226	89	525	192
		Cost to The Times	1,456.00	385.00	0	147.00	1,582.00	623.00	3,675.00	1,344.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		INJURIES — LOWER EXTREMITIES — ANKLE: SPRAINS, FRACTURES,—	FOOT AND TOES: INJURIES	FOOT AND TOES: FRACTURES	FEMUR: CONTUSIONS, LACERATIONS,—	FEMUR: FRACTURES	TIBIA AND FIBULA: CONTUSIONS, LACERATIONS,—	TIBIA AND FIBULA: FRACTURES	PATELLA: CONTUSIONS, ABRASIONS,—
A	1931	Number of Days Lost	16	58	13	0	0	38	0	0
	568 Empl.	Cost to The Times	112.00	406.00	91.00	0	0	266.00	0	0
	1932	Number of Days Lost	4	8	9	11	0	0	42	35
	521 Empl.	Cost to The Times	28.00	56.00	63.00	77.00	0	0	294.00	245.00
B	1931	Number of Days Lost	12	5	0	0	0	20	0	8
	1028 Empl.	Cost to The Times	84.00	35.00	0	0	0	140.00	0	56.00
	1932	Number of Days Lost	27	18	144	108	0	0	0	6
	1024 Empl.	Cost to The Times	189.00	126.00	1,008.00	756.00	0	0	0	42.00
C	1931	Number of Days Lost	22	24	9	48	72	7	0	84
	461 Empl.	Cost to The Times	154.00	168.00	63.00	336.00	504.00	49.00	0	588.00
	1932	Number of Days Lost	4	0	35	5	0	0	0	23
	468 Empl.	Cost to The Times	28.00	0	245.00	35.00	0	0	0	161.00
NO PX	1931	Number of Days Lost	18	10	14	17	0	31	0	21
	836 Empl.	Cost to The Times	126.00	70.00	98.00	119.00	0	217.00	0	147.00
	1932	Number of Days Lost	30	0	61	30	78	0	0	80
	919 Empl.	Cost to The Times	210.00	0	427.00	210.00	546.00	0	0	560.00
TOTAL	1931	Number of Days Lost	68	97	36	65	72	96	0	113
		Cost to The Times	476.00	679.00	252.00	455.00	504.00	672.00	0	791.00
	1932	Number of Days Lost	65	26	249	154	78	0	42	144
		Cost to The Times	455.00	182.00	1,743.00	1,078.00	546.00	0	294.00	1,008.00
D	1931	Number of Days Lost	0	0	0	0	0	0	0	0
	49 Empl.	Cost to The Times	0	0	0	0	0	0	0	0
	1932	Number of Days Lost	0	0	36	0	0	31	0	0
	60 Empl.	Cost to The Times	0	0	252.00	0	0	217.00	0	0
GRAND TOTAL	1931	Number of Days Lost	68	97	92	65	72	96	0	113
		Cost to The Times	476.00	679.00	644.00	455.00	504.00	672.00	0	791.00
	1932	Number of Days Lost	65	26	285	154	78	0	0	144
		Cost to The Times	455.00	182.00	1,995.00	1,078.00	546.00	0	0	1,008.00

MAJOR CHART B

MEDICAL RATING	MAJOR CHART—B— AVERAGE SALARY— $7.00 PER DAY		INJURIES													
			LOW. EXTR.	UPPER EXTREMITIES												
			PATTELA	HUMERUS			FOREARM AND RADIUS			FINGERS AND HANDS			MISCELLANEOUS			
			FRACTURES	CONTUSIONS, LACERATIONS,—		FRACTURES	CONTUSIONS, LACERATIONS,—		FRACTURES	CONTUSIONS, LACERATIONS,—		FRACTURES			
A	1931	Number of Days Lost	26	0		10	12		0	30		6	34		
	568 Empl.	Cost to The Times	182.00	0		70.00	84.00		0	210.00		42.00	238.00		
	1932	Number of Days Lost	0	0		0	20		0	44		18	5		
	521 Empl.	Cost to The Times	0	0		0	140.00			308.00		126.00	35.00		
B	1931	Number of Days Lost	46	12		0	6		37	201		60	150		
	1028 Empl.	Cost to The Times	322.00	84.00		0	42.00		259.00	1,407.00		420.00	1,050.00		
	1932	Number of Days Lost	0	20		0	12		47	78		54	240		
	1024 Empl.	Cost to The Times	0	140.00		0	84.00		329.00	546.00		378.00	1,680.00		
C	1931	Number of Days Lost	0	0		50	0		0	37		93	50		
	461 Empl.	Cost to The Times	0	0		350.00	0		0	259.00		651.00	350.00		
	1932	Number of Days Lost	0	0		0	10		28	16		13	83		
	468 Empl.	Cost to The Times	0	0		0	70.00		196.00	112.00		91.00	581.00		
NO PX	1931	Number of Days Lost	0	30		0	0		115	242		88	57		
	836 Empl.	Cost to The Times	0	210.00		0	0		805.00	1,694.00		616.00	1,799.00		
	1932	Number of Days Lost		6		0	0		0	69		74	66		
	919 Empl.	Cost to The Times	0	42.00		0	0		0	469.00		518.00	462.00		
TOTAL	1931	Number of Days Lost	72	42		60	18		152	510		247	491		
		Cost to The Times	504.00	294.00		420.00	126.00		1,064.00	3,570.00		1,729.00	3,437.00		
	1932	Number of Days Lost	0	26		0	42		75	205		159	394		
		Cost to The Times	0	182.00		0	294.00		525.00	1,435.00		1,113.00	2,758.00		
D	1931	Number of Days Lost	0	62		0	0		0	6		0	7		
	49 Empl.	Cost to The Times	0	434.00		0	0		0	42.00		0	49.00		
	1932	Number of Days Lost	0	0		0	0		0	0		0	29		
	60 Empl.	Cost to The Times	0	0		0	0		0	0		0	203.00		
GRAND TOTAL	1931	Number of Days Lost	72	104		60	18		152	516		247	498		
		Cost to The Times	504.00	728.00		420.00	126.00		1,064.00	3,612.00		1,729.00	3,486.00		
	1932	Number of Days Lost	0	26		0	42		75	205		159	423		
		Cost to The Times	0	182.00		0	294.00		525.00	1,435.00		1,113.00	2,961.00		

trast this with the "A" group in which 493 men, working 3½ years, lost 10 days. The importance of a physical examination in foretelling time loss is well illustrated by these two extreme groups.

The percentage time loss from injury and illness increases for all groups from "A" to "D." The individual group differences show that "C" individuals are more prone to injury than those in "A" and "B." In group "D," the difference is again explained by the tendency on the part of these individuals to work with minor injuries and illnesses more readily than the individuals in all other groups that are paid full wages for the time loss due to illness and injury.

The average cost per man per year very clearly indicates the difference in individuals when a medical selection is made. The difference in a cost of $25 per man per year in the "A" group and $34 per man per year represents the additional liability of individuals in Group "B" as compared with those in Group "A." The difference in $25 per man in Group "A" and $41 per man in Group "C" represents the added cost of individuals in Group "C," even though in the estimation of the medical examiner Group "C" should have lost no more time than Group "A." Any change in the rules for selection naturally would be made in excluding those individuals in this group with conditions that have shown them to be more prone to illness or injury than those in Group "A." Tightening up the rules would be done in this group mainly, unless the employer wished to go further and eliminate the inferior individuals in Group "B." Or, their acceptance by the Medical Department could be withheld until the existing conditions had been attended to. The latter plan is hardly feasible, as jobs have to be filled, and it is relatively more simple to take off the time for correction rather than to keep a job unfilled. The difference in an average of $32 per man per year in the acceptable group against $88 per man per year in the non-acceptable group is a concrete figure that could be used to estimate the value of the Medical Department. The number in group "D" that were rejected for employment would have been spread through all groups to increase the average loss of time had they not been selected physically. The difference in $32 per man per year for the average cost in the acceptable

MAJOR CHART C

MEDICAL SURVEY OF PRESENT EMPLOYEES WHO HAVE HAD PHYSICAL EXAMINATIONS 1921 TO 1931

Number of Employees According to Medical Rating	Total Years of Employment	Number of Employees Who Have		Percentage	Time Off Due to Pre-existing Causes	TOTAL TIME LOST	Time Lost Account Of		Percentage Lost Time		COST TO TIMES on Average Salary Basis	Percentage Lost Time
		Lost No Time	Lost Time				Illness	Injury	Illness	Injury		
"A" 493	1716 or 3½ Yrs. per Man	250	243	49.3	10 Days	6145 Days 14 Years 7 Mos. 2 Wks. 4 Days	4302 Days 13 Years 8 Mos. 4 Wks. 1 Day	1843 Days 5 Years 10 Mos. 3 Wks.	70.0	30.0	$43,015 $87.25 per Man $25.06 per Man per Year	1.14
"B" 855	2746 or 3¼ Yrs. per Man	355	500	58.2	329 Days 1 Year 2 Wks. 4 Days	13,338 Days 42 Years 7 Mos. 1 Wk. 4 Days	9286 Days 29 Years 8 Mos. 1 Day	4052 Days 12 Years 11 Mos. 1 Wk. 4 Days	69.6	30.4	$93,366 $109.20 per Man $ 34.00 per Man per Year	1.55
"C" 377	1192 or 3¼ Yrs. per Man	160	217	57.3	306 Days 11 Mos. 3 Wks. 2 Days	7016 Days 22 Years 5 Mos.	4672 Days 14 Years 11 Mos. 4 Days	2344 Days 7 Years 5 Mos. 3 Wks. 5 Days	66.6	33.4	$49,112 $130.27 per Man $ 41.20 per Man per Year	1.88
TOTAL 1725	5654 or 3¼ Yrs. per Man	765	960	55.5	645 Days 2 Years 3 Weeks 1 Day	26,499 Days 84 Years 7 Mos. 4 Wks. 1 Day	18,260 Days 58 Years 4 Mos. 2 Days	8239 Days 26 Years 3 Mos. 3 Wks. 5 Days	68.9	31.1	$185,493 $107.53 per Man $ 32.81 per Man per Year	1.50
"D" 38	161 or 4¼ Yrs. per Man	19	19	50.0	1144 Days 3 Years 7 Mos. 3 Wks. 5 Days	2024 Days 6 Years 5 Mos. 2 Wks. 4 Days	1687 Days 5 Years 4 Mos. 3 Wks.	337 Days 1 Year 4 Wks.	83.3	16.7	$14,168 $372.84 per Man $ 88.00 per Man per Year	4.02

PRESENT EMPLOYEES WHO HAVE NOT HAD PHYSICAL EXAMINATIONS

785	7029 or 9 Yrs. per Man	139	646	82.3		41,436 Days 132 Years 4 Mos. 2 Wks. 4 Days	29,515 Days 94 Years 3 Mos. 2 Wks. 3 Days	11,921 Days 38 Years 1 Mo. 1 Day	71.2	28.8	$290,052 $369.49 per Man $ 41.27 per Man per Year	1.88

groups and $41 per man per year in the No Px or naturally selected group represents the difference in cost of medically selected individuals and in taking them as they come without respect for their physical fitness. Natural selection here is also influenced by the average years per man of employment: 3¼ years in the selected and nine years in the non-selected. During the additional six years, natural means would be expected to eliminate many "D" individuals.

The last column shows clearly and simply the difference in individuals that occurs when they are grouped by physical examination according to physical fitness, unfitness and natural grouping.

Group "D" with a percentage loss time of 4.02 includes individuals to all intent perfectly able to do hard manual labor. These individuals were not rejected from employment because of their labor union affiliation. This time loss of 4.02% would, if paid for, no doubt, have been much greater. As a study of the other columns indicates, these individuals work at times with conditions which individuals in other groups, who are entitled to pay, would consider sufficient to necessitate laying off.

The Medical Department has no definite means to determine the value of an individual's stand in the acceptable group over that in the non-acceptable group. It has been an obvious fact from the first that when individuals are not paid for loss of time, they will frequently insist upon working with conditions that the Medical Department advises laying off for. Likewise, individuals in the acceptable group, being paid for loss of time, often refuse to work with conditions that individuals receiving no disability pay work with, without loss of time. This stand may be looked upon from both sides. The Medical Department may believe an individual should work with a minor injury and send him in. The boss may send him home because the injury slows him up and interferes with other members of the department. Again, the Medical Department may receive a complaint from the head of the department that some one is laying off with what seems to be a trivial and not disabling injury. The same is true for illness, except that there the Medical Department assumes sole responsibility after an examination for the advice as to work. In cases of injury, the opinion of the department head is often sought by the Medical Department before advising the injured individual.

See Page 639 for Text on MAJOR CHART D.

MAJOR CHART D

Number of Employees According to Medical Rating		Total Years of Employment	Number of Employees Who Have		Percentage of Employees Who Have Lost Time	Time Lost due to Pre-existing Conditions		TOTAL TIME LOST (Days)	Time Lost Because of		Percentage of Time Lost		COST TO TIMES on Average Salary Basis ($7 per Day)	Percentage of Working Days Lost
			Lost No Time	Lost Time		Days	Percentage		Illness	Injury	Illness	Injury		
	1921–31 493	1716 3½/man	250	243	49.3	10	0.162	6145	4302	1843	70	30	$43,015 $87.25 per man $25.06 per man per yr.	1.14
A	1931 568		434	134	23.5	15	0.763	1963	1631	332	83	17	$13 741 $22.43 per man	1.1
	1921–31 855	2746 3¼/man	355	500	58.2	329	2.46	13338	9286	4052	69.6	30.4	$93,366 $109.20 per man $34.00 per man per yr.	155
B	1931 1028		764	264	25.7	104	2.30	4513	3553	960	79	21	$31,591 $30.73 per man	1.4
	1921–31 377	1192 3¼/man	160	217	57.3	306	4.36	7016	4672	2344	66.6	33.4	$49,112 $130.27 per man $41.20 per man per yr.	1.88
C	1931 461		332	129	27.9	264	12.44	2121	1384	737	65	35	$1,4847 $32.20 per man	1.46
Total "PX" Group	1921–31 1725	5654 3¼/man	765	960	55.5	645	2.43	26499	18260	8239	68.9	31.1	$185,493 $107.53 per man $32.81 per man per yr.	1.5
	1931 2057		1530	527	25.6	383	4.45	8597	6568	2029	76	24	$60 179 $29.20 per man	1.33
No "PX" Group	1921–31 785	7029 9/man	139	646	82.3	.....	.....	41436	29515	11921	71.2	28.8	$290,052 $369.49 per man $41.27 per man per yr.	1.88
	1931 826		593	233	28.2	.....	.....	7854	6094	1760	78	22	$54,978 $66.55 per man	3.0
Grand Total	1921–31 2510	1273 5/man	904	1606	63.9	645	0.94	67935	47775	20160	70.3	29.7	$475,545 $189.46 per man $37 89 per man per yr.	1.71
	1931 2883		2123	760	26.3	383	2.32	16451	12662	3789	77	23	$115 157 $39.94 per man	1.8
	1921–31 38	161 4¼/man	19	19	50.0	1144	56.5	2024	1687	337	83.3	16.7	$14,168 $372.84 per man $88.00 per man per yr.	4.02
D	1931 49		39	10	20.2	574	84.0	683	588	95	86	14	$4,781 $97.57 per man	4.4

MAJOR CHART E

MEDICAL SURVEY OF PRESENT EMPLOYEES FOR THE YEAR 1931

Number of Employees According to Medical Rating	Number of Employees Who Have Lost		Time Lost Due to Pre-existing Conditions	TOTAL TIME LOST	Time Lost Because of		Percentage Time Lost		COST TO TIMES On Average Salary Basis ($7 per Day)	Percentage of Time Lost
	No Time	Time			Illness	Injury	Illness	Injury		
A 568	434	134	15 Days	1963 Days (6y.-3m.-7d.)	1631 Days (5y.-2m.-14d.)	332 Days (1y.-19d.)	83%	17%	$13,741.00 ($22.43 per man)	1.1%
B 1028	764	264	104 Days	4513 Days (14y.-5m.-1d.)	3553 Days (11y.-4m.-6d.)	960 Days (3y.-21d.)	79%	21%	$31,591.00 ($30.73 per man)	1.4%
C 461	332	129	264 Days	2121 Days (6y.-9m.-9d.)	1384 Days (4y.-5m.-2d.)	737 Days (2y.-4m.-7d.)	65%	35%	$14,847.00 ($32.20 per man)	1.46%
TOTAL (Employees who have had PX) 2057	1530	527	383 Days	8597 Days (27y.-5m.-16d.)	6568 Days (20y.-10m.-22d.)	2029 Days (6y.-5m.-21d.)	76%	24%	$60,179.00 ($29.20 per man)	1.33%
NO PX 826	593	233	.....	7854 Days (25y.-1m.-3d.)	6094 Days (19y.-5m.-17d.)	1760 Days (5y.-7m.-3d.)	78%	22%	$54,987.00 ($66.55 per man)	3%
GRAND TOTAL 2883	2123	760	383 Days	16 451 Days (52y.-6m.-19d.)	12 662 Days (40y.-5m.-12d.)	3789 Days (12y.-1m.-7d.)	77%	23%	$115,157.00 ($39.94 per man)	1.8%
D 49	39	10	574 Days	683 Days (2y.-2m.-5d.)	588 Days (1y.-10m.-15d.)	95 Days (3m.-17d.)	86%	14%	$ 4,781.00 ($97.57 per man)	4.4%

MAJOR CHART F

MEDICAL SURVEY OF PRESENT EMPLOYEES FOR THE YEAR OF 1932

Number of Employees According to Medical Rating	Number of Employees Who Have Lost		Time Lost Due to Pre-existing Conditions	TOTAL TIME LOST	Time Lost Because of		Percentage Time Lost		COST TO TIMES On Average Salary Basis ($7 per Day)	Percentage of Working Days Lost
	No Time	Time			Illness	Injury	Illness	Injury		
"A" 521	402	119	83 Days	1683 Days (3 das. person)	1283 Days	400 Days	76%	24%	$11,781.00 ($22.60 person)	1.3%
"B" 1024	779	245	303 Days	4776 Days (4½das.person)	3615 Days	1161 Days	76%	24%	$33,432.00 ($32.51 person)	1.5%
"C" 468	372	96	59 Days	1688 Days (3½das.person)	1354 Days	334 Days	80%	20%	$11,816.00 ($25.25 person)	1.1%
TOTAL "PX" GROUP 2013	1553	460	445 Days	8147 Days (4 das. person)	6252 Days	1895 Days	76%	24%	$57,029.00 ($28.33 person)	1.3%
"NO PX" 919	744	175	.....	5750 Days (6 das person)	4682 Days	1068 Days	81%	19%	$40,250.00 ($43.79 person)	2.3%
GRAND TOTAL 2932	2297	635	445 Days	13,897 Days (4½das.person)	10934 Days	2963 Days	78%	22%	$97,279.00 ($33.17 person)	1.5%
"D" 60	47	13	460 Days	615 Days (10 das. person)	507 Days	108 Days	82%	18%	$ 4,305.00 ($71.75 person)	3.2%

Major Chart D

See Page 637 for MAJOR CHART D.

A COMPARISON of Major Chart C representing the 10-year period with Major Chart E representing the succeeding year (1931) shows some striking changes.

The greatest difference is in the percentage time loss from illness and injury. A marked decrease in the percentage time loss due to injury is noted in all groups. This is attributed by the Medical Department to a slowing up. Hurry and overwork are apparent as the greatest causes of accidents. During 1931, the employees were not rushing to complete their daily tasks. Also, the rest periods

MAJOR CHART G

Number of Employees According to Medical Rating		Total Years of Employment	Number of Employees Who Have		Percentage of Employees Who Have	Time Lost due to Preexisting Conditions		TOTAL TIME LOST	Time Lost Because of		Percentage of Time Lost		COST TO TIMES on Average Salary Basis ($7 per Day)	Percentage of Working Days Lost
			Lost No Time	Lost Time		Days	Percentage	(Days)	Illness	Injury	Illness	Injury		
	1921–31	1716											$43,015	
	493	3½/man	250	243	49.3	10	0.162	6145	4302	1843	70	30	$87.25 per man	1.14
													$25.06 per man per yr.	
	1931												$13,741	
A	568		434	134	23.5	15	0.763	1963	1631	332	83	17	$22.43 per man	1.1
	1932												$11,781	
	521		402	119	22.8	83	4.93	1683	1283	400	76	24	$22.60 per man	1.3
	1921–31												$93,366	
	855	3¼/man	355	500	58.2	329	2.46	13338	9286	4052	69.6	30.4	$109.20 per man	1.55
													$34.00 per man per yr.	
	1931												$31,591	
B	1028		764	264	25.7	104	2.30	4513	3553	960	79	21	$30.73 per man	1.4
	1932												$33,432	
	1024		779	245	23.9	303	6.34	4776	3615	1161	76	24	$32.51 per man	1.5
	1921–31	1192											$49,112	
	377	3¼/man	160	217	57.3	306	4.36	7016	4672	2344	66.6	33.4	$130.27 per man	1.88
													$41.20 per man per yr.	
	1931												$14,847	
C	461		332	129	27.9	264	12.44	2121	1384	737	65	35	$32.20 per man	1.46
	1932												$11,816	
	468		372	96	20.5	59	3.49	1688	1354	334	80	20	$25.25 per man	1.1
	1921–31	5654											$185,493	
	1725	3¼/man	765	960	55.5	645	2.43	26499	18260	8239	68.9	31.1	$107.53 per man	1.5
													$32.81 per man per yr.	
Total "PX" Group	1931												$60,179	
	2057		1530	527	25.6	383	4.45	8597	6568	2029	76	24	$29.20 per man	1.33
	1932												$57,029	
	2013		1553	460	22.8	445	5.46	8147	6252	1895	76	24	$28.33 per man	1.3
	1921–31	7029											$290,052	
	785	9/man	139	646	82.3	.....	.....	41436	29515	11921	71.2	28.8	$369.49 per man	1.88
													$41.27 per man per yr.	
No "PX" Group	1931												$54,978	
	826		593	233	28.2	.....	.....	7854	6094	1760	78	22	$66.55 per man	3.0
	1932												$40,250	
	919		744	175	17.9	.....	.....	5750	4682	1068	81	19	$43.79 per man	2.3
	1921–31	1273											$475,545	
	2510	5/man	904	1606	63.9	645	0.94	67935	47775	20160	70.3	29.7	$189.46 per man	1.71
													$37.89 per man per yr.	
Grand Total	1931												$115,157	
	2883		2123	760	26.3	383	2.32	16451	12662	3789	77	23	$39.94 per man	1.8
	1932												$97,279	
	2932		2297	635	21.6	445	3.20	13897	10934	2963	78	22	$33.17 per man	1.5
	1921–32	161											$14,168	
	38	4¼/man	19	19	50.0	1144	56.5	2024	1687	337	83.3	16.7	$372.84 per man	4.02
													$88.00 per man per yr.	
	1931												$4,781	
D	49		39	10	20.2	574	84.0	683	588	95	86	14	$97.57 per man	4.4
	1932												$4,305	
	60		47	13	21.6	460	74.8	615	507	108	82	18	$71.75 per man	3.2

in every week from enforced idleness are no doubt responsible for a decrease in accidents.

The cost per man per year shows a decrease for all acceptable groups and an increase in the non-acceptable and No Px groups. The percentage loss time in the acceptable groups is less, but greater in the non-acceptable and No Px groups.

MAJOR CHART E is an analysis of the year 1931.

MAJOR CHART F is an analysis of the year 1932.

Major Chart G

See Page 639 for MAJOR CHART G.

A COMPARISON of the 10-year period with 1931 and 1932 shows an increase in the percentage of time loss due to injury in groups "A" and "B" and the total in the acceptable groups. A drop is noted in the No Px group and in increase in the "D" group, the latter with a material increase in numbers of individuals in the group.

There is also an increase in the percentage of time loss in the "A" and "B" groups over 1931; a small decrease in the total percentage loss time in the acceptable group over the 10-year period and for 1931. The decrease is due to improvement in the "C" group. In addition, there was a decrease in the time loss in the "D" group in 1932 over 1931 and the 10-year period. In the No Px group, a marked increase in the percentage of loss time was expected, due to the increasing age of the individuals in the group. The contrary was true. This experience serves to show that adversity works its greatest hardship on the less fit and aged individuals. Those fit and hardy individuals, more sure of their jobs, are less affected by a depression than those less fit and aged who may fear the loss of their positions due to loss of time from relatively minor illnesses and injuries. Heavier responsibilities in the older group may also influence the No Px and older group to work with conditions that younger persons, such as those in the "A" and "B" groups, with less responsibilities would be incapacitated by.

Up to this point in the statistical analysis, the Medical Department felt that a medical prediction as to loss of time was accurate when applied to large numbers of individuals over a long period of time. However, in the analysis of the year 1932, there was shown a factor that would influence the medical prediction. An economic depression has a definite bearing upon medical experience in all groups of individuals. This influence is primary and secondary when viewed by an experience that takes a large group of individuals through a normal period up through an inflationary period and down through the depth of the depression. The final proof of this influence over a medical prediction will be decided by our experience in the years of 1933, 1934 and 1935 (in the event of recovery) when the data for these years have been compiled and studied.

MINOR CHART A

Number of Rejections as Compared with Physical Examinations

Year	Physical Examinations	Rejections	Percentage
1930	756	48	6.3%
1931	605	41	6.7%
1932	204	15	7.3%

Causes of Rejections

Diagnosis	1930	1931	1932
1. Hypertension	8	9	8
2. Kidney Conditions	7	12	1
3. Cardiac Conditions	12	3	—
4. Suspicious Chest	1	2	2
5. Eye Conditions	3	—	1
6. Age	—	3	2
7. Diabetes	—	2	—
8. History of Venereal Disease	1	—	—
9. History of Typhoid	—	1	—
10. History and General Condition	—	1	—
11. Mental Deficiency	—	1	—
12. Defective Hearing	—	1	—
13. Possible CA of Sigmoid	1	—	—
14. Suspicious Genito-Urinary History	—	—	1
15. Failure to Complete Examination	15	6	—
Totals	48	41	15

Minor Chart A

REJECTION for employment because of physical findings of defects runs about 6.5%. This percentage is not apparently influenced by the number of prospective employees examined as seen by the average remaining about the same for 1930 when 756 examinations were made as that for 1932 when 204 were examined. There is, however, a great variation in the causes of rejections, as noted in the list of the first 15 causes for rejection during three successive years.

An interesting difference is noted in the fact that 15 failed to complete their examination in 1930 whereas all were completed in 1932. In 1930, jobs were relatively easy to find and there were 15 out of 756 individuals that preferred not to have a physical examination and would not undergo the test; while in 1932, all jobs being scarce, every applicant underwent the examination. The difference in hypertension is apparent here in that eight in 756 in 1930 were rejected against eight in 204 in 1932. Another possible effect of the depression.

Minor Chart B

THIS chart represents the experience in examining individuals for employment that have herniae. Herniae have been placed in group B until repaired; after that, in group C; and when having been operated upon before examination, in group C. A preliminary examination in which a hernia is discovered and recorded definitely excludes such a hernia as a cause of compensation later on.

Preliminary medical examination occupies the interests of labor, the employer and the medical fraternity.

Whatever position regarding it the first two may take, it should not deter the medical profession from taking the stand that sufficient medical experience can be worked out to enable the insurance companies to construct a plan that would permit every one able to do his job to be employed on an equitable basis, particularly with respect to benefit plans.

MINOR CHART B

Hernias Present at Time of Physical Examination, or History of Herniotomy

	1921 thru 1930		1931		1932	
Group	Not Operated	Operated	Not Operated	Operated	Not Operated	Operated
A	5	2	1	1	—	—
B	41	17	2	7	1	3
C	28	4	9	1	2	1
D	5	2	2	—	1	—
Totals	79	25	14	9	4	4

Time Lost Due to Hernias Which Were Present at Time of Physical Examination

Group	No. of Cases	Days Lost	No. of Cases	Days Lost	No. of Cases	Days Lost
A	—	—	—	—	—	—
B	7	261	1	24	1	48
C	3	156	3	132	—	—
D	—	—	—	—	—	—
Totals	10	417	4	156	1	48

Conclusion

A MEDICAL examination preliminary to employment can be fairly done as is evidenced by the experience in the various groups herein given.

The prediction of the average loss of time for individuals of different physical fitness can be fairly accurately made. Factors, such as the depression, materially influence a medical rating. Further experience may definitely place such factors.

The acceptance of applicants in all physical groups of individuals is the ideal for which every medical department should strive. Refusing to employ an increasing number of physically inferior individuals, although they can work, will surely lead to increased social responsibilities that can be avoided.

Reducing the expenses or costs of all groups to a known figure can readily be done by ordinary rating up or rating down to a common level each individual applicant upon the physical findings. This would enable any employer to accept all applicants, that were able to work, on a fixed basis of percentage time loss. The benefit payments can be figured accordingly so that each individual may be expected to receive the same relative benefit under any plan.

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Industrial Dermatoses

—*Some of the Problems in Diagnosis, Prevention and Treatment*—

by

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INDUSTRIAL dermatoses constitute 60% of the industrial diseases, not including actual accidents. The figures gathered from the states of Ohio, Missouri, Connecticut, New York, Massachusetts and Wisconsin show that among 15,050 industrial diseases recorded in these states over a period of years, 9,628 were dermatoses. In these states there was an average of 2,944 cases of occupational dermatitis yearly. By comparing the population of the above states with that of all the states we can safely estimate that there occur yearly in the United States at least 12,000 cases of occupational dermatitis of sufficient severity to be reported. In 1934 New York had 1,012 cases of occupational diseases, with 689 cases of compensated dermatoses. These were largely made of dermatitis venenata and dermatitis eczematosa. Included were a few cases of glanders, tuberculosis, anthrax, actinomycoses, sporotrichosis, erysipeloid, keratoses, cancer, callouses, burns and abrasions.

Employees with milder dermatoses, or through fear of losing their positions because of their hypersensitivity to the materials with which they worked, or because of prospective financial loss while being carried as a compensation case, often continued at their occupations. On the other hand, a larger number claimed compensation for trivial or unconnected dermatoses when fear of a lay-off or of earning less than compensation rates seemed imminent. This last group includes some malingerers who actually produce dermatoses or who prolong and maintain them in a variety of ways.

From the examination of large groups of workers in various industries we can safely say that more than 1% of the workers engaged in basic industries suffer some time during the year with an occupational dermatitis. These cases in general do not go to free clinics but to private physicians. A study of the number of trade dermatitis consultations in a published bulletin of a New York Hospital for the years from 1928 to 1933 inclusive, discloses only 138 in over 600,000 consultations, i. e., less than one in every five to six thousand. We do not question that a much larger number were seen and catalogued as dermatitis venenata or eczemas. Certainly in clinic work a segregation of these cases with their special problems is indicated. We must agree with C. Guy Lane[1] that a more accurate and generally accepted classification of these diseases would be of great aid in their study. Over 10% of the cases of dermatitis venenata and eczema upon better analysis and classification would be occupational in origin. It must also be realixed that a large percentage of dermatitis cases found in industrial workers is due to the worker's contacts outside of his occupation.[2]

WE MUST still be uncertain as to the part played by variations in pigmentation and age in the matter of predisposition. Blondes, the relatively young, and the aged are perhaps the more susceptible to skin irritants. Unusually dry or moist skins are certainly predisposing factors. Thick and oily skins are undoubtedly more resistant.

Diseased and abnormal skins are more susceptible. Seborrhea, icthyosis, pyogenic infections both focal and local, and individuals with skin injured from any cause offer less resistance to a skin irritant. A history of recurrent skin eruptions is always an indication of the possibility of skin sensitivity thereby increasing chances of dermatitis. After sensitivity develops to one agent, the worker tends to be more sensitive to other substances.[3]

Fungus infections in their wide prevalence force us to consider their effect. They rank first in the group of other causes discussed above as injuring the skin. Secondly, with their induction of "phytids" they set up sensitizing mechanisms with a tendency to become polyvalent.[4]

Finally, the rough, ignorant, careless and slovenly person with poor hygiene, who does not keep his skin clean, and who is careless about his clothes, is a menace to himself by providing the element of increased exposure, both temporal and quantitative, to the multitude of irritants about him. The individual with hay-fever, asthma, and other manifestations of non-cutaneous allergy does not appear to be predisposed to occupational dermatitis, according to our own observations.

The chief causes of industrial dermatitis differ in various localities according to the prevailing types of industry. In rural communities plant poisonings are prevalent. In Missouri, out of over 1,020 cases of industrial dermatitis, 69% were due to lime and cement; 15% were due to poison ivy; 9% to caustics and acids; 6% to lye and 2% to petroleum products. In California, the fruit business is the most important. In New York State (1933) of 489 cases of occupational dermatitis, 50% were due to plants, 12% to soaps and washing powders, 6% to dyes, 3% to turpentine, and 2% to petroleum products, the remaining cases being due to a wide variety of causes. In 1934, New York State had 1,012 occupational disease claims disposed of, in which process 439 were allowed and 573 were disallowed. Table 2 shows the reason for disallowance in 56.4% of the cases of occupational poisoning and disease.

Table 3 by the Division of Industrial Hygiene, from the New York State Department of Labor, is instructive.

It can be safely stated that in general the majority of industrial skin diseases in the United States are caused by the action of acids, alkalis, caustics, oils, greases, solvents, and plants. It is possible to

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classify the actual causes in a simple way as follows:

1. *Physical Agents*: burns, scalds, extreme cold, radiations of ultraviolet light, heat, Roentgen rays and trauma.

2. *General Irritants* (Table 4):

These are agents which will irritate any skin. A direct, predictable, toxic effect is possible with these chemicals. The inorganic general irritants can be subdivided into acids, strong alkalis, and caustics. The organic irritants can be divided into acids and solvents.

3. *Specific Irritants*: These do not affect everyone, but cause skin lesions in a considerable percentage. A partial list follows:

(a) Oils and greases, such as lubricating, vegetable and essential oils.

(b) Dyes. Certain of the aniline dyes such as paraphenylendiamine, malachite-green, crystal-violet, bismark-brown, auramine, and the intermediates and decomposition products. Some of these intermediates, which are very irritating, are: dinitrochlorbenzol, phenyl-hydrazine, phenyl-glycine, anthracene and benzidine.

(c) Explosives, such as tetryl, T. N. T., lead azide, lead styphnate, fulminate of mercury, etc.

(d) Rubber accelerators, such as hexamethylene-tetramine, trimene, tetramethylthiuramdisulphide.

(e) Rubber anti-oxidants, such as phenylbetan-aphthylamine.

4. *Many plants* are irritating to certain individuals. Among the most common plant irritants are oak, sumac, ivy, pyrethrum, cocobola, Brazilian walnut, primrose and chrysanthemum.

5. *Biologic Agents*: These may be divided into:

(a) Parasites, such as those which cause grain itch, straw itch, and linseed itch.

(b) Bacterial infections, such as erysipeloid, common among butchers and caused by the bacillus of swine erysipelas, glanders and actinomycosis.

(c) Fungus infections, such as monilia infections, occuring on the hands of fruit packers and ring-worm infections of the hands and feet, common among barbers, wool-sorters, animal handlers and bath attendants.

To summarize the biologic agents:

The action on the skin of these various causes may be classified as follows:

1. *Keratin and Fat Solvents*, such as mild alkalis, soaps, turpentine and vegetable oils.

2. *Desiccators*, or hygroscopic agents, which take the water out of the skin, such as sulphuric acid and powerful alkalis.

3. *Protein Precipitants*, which form albuminates in combining with the skin. Heavy metal salts act in this manner.

4. *Oxidizers*, such as choride gas, peroxide of hydrogen, chromic acid and its salts.

5. *There is a group which tends to hydrolize* when coming in contact with the moisture of the skin thus forming irritating compounds. Hexamethylenetetramine, for example, on hydrolizing forms formaldehyde and formic acid.

State	Year	Occupational Diseases	Dermatoses
California	1933	1,528	1,156
Connecticut	1933	557	383
Massachusetts	1932	954	613
Minnesota	1932	673	497
Missouri	Average 3 years	1,800	1,000
New Jersey	1933	468	352
New York	1934	1,012	689
Ohio	1934	1,582	902
Wisconsin	Average 3 years	301	190
Total		8,875	5,787

About 65% of occupational disease are dermatoses.
Annual occurrence in United States of occupational dermatoses losing time from work estimated at 20,000 cases.
Studies of United States Public Health Service show that more than 1% of workers are affected with occupational dermatoses.
Average compensated case loses 10 weeks from work.
Average compensation $100.00
Average cost of medical care 90.00
Annual loss from occupational dermatoses estimated at $4,000,000.00

Table 1. Reported Frequency of Occurrence

6. *Certain substances act as stimulants or irritants to the keratin forming cells of the skin* and are apt to cause new growths. Arsenic, petroleum products and aniline are substances of this kind.

7. *Then there is another group which is composed of sensitizers.* The nitro and the nitrosoe compounds act in this manner. This group is a very large one.

While it is certainly true that many cases of dermatitis develop only after years of exposure, most cases occur promptly in new workers or in employees exposed to new sensitizers. There is a definite epidemiology which appears in the exposure of individuals to a new irritant. Where to draw the line between irritants and sensitizers is often very difficult in classification. Dinitro-chlorbenzol in strong solution will irritate any skin. Individuals who become sensitized to it in some cases cannot enter a building in which it is in use without developing a facial erythema.[5] However,

Reason for Disallowance	Up-State	New York City area	Total No.	Per cent
Not covered by act	15	87	102	17.8
No proof of causal relation	7	7	14	2.4
No medical evidence	9	50	59	10.4
Not an occupational disease	16	7	23	4.0
No proof of disease	4	1	5	.9
Not contracted within 1 year	—	1	1	.2
Disability less than 7 days	159	22	181	31.0
No disability	34	49	83	14.5
No appearance of claimant	41	44	85	14.8
No claim filed	3	6	9	1.6
No notice in time	1	2	3	.5
Claim abandoned	—	1	1	.2
No jurisdiction	1	1	2	.3
Grounds not recorded	3	2	5	.8
TOTAL	293	280	573	100.0

Table 2. Disallowed Cases, by Cause, 1934.

a ½ to 1% solution may be used of this same chemical to patch test normal individuals who will show a negative test after 24 hours.

A demonstration of a strongly sensitizing varnish occurred in an outbreak of dermatitis among 19 out of 32 exposed employees in two cotton mills. The latent period was from three days to four weeks of contact before the dermatitis appeared. The more severe cases appeared earlier. Twelve out of 13 cases who developed a dermatitis were examined and had positive patch tests for the varnish. Five non-exposed individuals had negative patch tests.

a dermatitis from the materials which he previously handled with safety. Immunity does not develop in this type of sensitivity. They tend to develop hypersensitivity to other substances, and present a very difficult problem.

Symptoms and Course

WHEN the average patient is first affected with itching and burning and the visible signs of an occupational dermatitis, and he presents himself for examination, his clinical appearance, excepting in a few cases, does not offer a clue to the irritant.

Cause	Up State			N. Y. C.			Total		
	All.	Dis.	Total	All.	Dis.	Total	All.	Dis.	Total
Acetic acid	—	—	—	2	1	3	2	1	3
Acid unknown	1	3	4	1	1	2	2	4	6
Alkali	4	11	15	1	2	3	5	13	18
Aluminum silicate	—	—	—	—	1	1	—	1	1
Amido benz	—	—	—	14	6	20	14	6	20
Ammonia	—	2	2	6	—	6	6	2	8
Anilin	2	1	3	19	5	24	21	6	27
Arsenic	—	—	—	3	—	3	3	—	3
Benzine	—	—	—	3	—	3	3	—	3
Benzol	1	—	1	—	—	—	1	—	1
Calcium hydroxide	2	—	2	3	—	3	5	—	5
Cellulose acetate	—	—	—	1	1	—	1	1	
Cement	5	7	12	7	—	7	12	7	19
Chemical unknown	3	—	3	—	2	2	3	2	5
Chrome	7	10	17	7	1	8	14	11	25
Citric acid	—	—	—	—	1	1	—	1	1
Color	1	—	1	—	—	—	1	—	1
Creosote	1	—	1	—	—	—	1	—	1
Dermatitis unknown	2	7	9	1	3	4	3	10	13
Dermatitis NS	—	22	22	1	64	65	1	86	87
Dust unsp.	—	1	1	—	—	—	—	1	1
Dye, cloth	—	3	3	—	—	—	—	3	3
Dye, fur	—	—	—	5	14	19	5	14	19
Dye, leather	3	—	3	—	—	—	3	—	3
Dye, silk	—	—	—	1	1	2	1	1	2
Dye, unsp.	2	3	5	—	2	2	2	5	7
Ethylene glycol	1	—	1	—	—	—	1	—	1
Flour	—	2	2	1	1	2	1	3	4
Formalin	—	1	1	—	—	—	—	1	1
Friction	—	—	—	3	3	6	3	3	6
Fruit	—	—	—	1	1	2	1	1	2
Fur	1	—	1	—	1	1	1	1	2
Gasoline	5	7	12	7	2	9	12	9	21
Glue	—	1	1	—	—	—	—	1	1
Hydrochloric acid	—	—	—	2	2	4	2	2	4
Hydrocyanic acid	—	—	—	1	—	1	1	—	1
Hydrofluoric acid	—	—	—	—	1	1	—	1	1
Hydrofluosilicic acid	1	—	1	—	—	—	—	1	1
Hydroxy benzene	—	—	—	1	—	1	1	—	1
Infection	1	—	1	—	—	—	—	1	1
Ink	—	1	1	—	—	—	—	1	1
Kerosene	2	2	4	—	2	2	2	4	6
Lacquer	3	3	6	—	1	1	3	4	7
Lead point	—	—	—	1	1	2	1	1	2
Leather dust	1	—	1	—	—	—	1	—	1
Mercury	—	1	1	—	—	—	—	1	1
Metapara aminophenol	—	1	1	—	2	2	—	3	3
Methyl alcohol	1	1	2	1	—	1	2	1	3
Naphthalene	—	—	—	3	3	6	3	3	6
Nickel	—	1	1	2	1	3	2	2	4
Nitrocellulose solvent	—	—	—	—	1	1	—	1	1
Oil unsp.	3	3	6	4	2	6	7	5	12
Oil essential	—	—	—	1	—	1	1	—	1
Oil machine	2	6	8	2	6	8	4	12	16
Oil mineral	—	—	—	6	3	9	6	3	9
Oil vegetable	1	—	1	2	1	3	3	1	4
Oxalic acid	—	1	1	3	—	3	3	1	4
Paint	—	2	2	1	—	1	1	2	3
Paraphenyl diamine	—	—	—	1	—	1	1	—	1
Petroleum naphtha	—	—	—	1	2	3	1	2	3
Phenol products	1	3	4	3	2	5	4	5	9
Plants unsp.	—	1	1	—	2	2	—	3	3
Poison ivy	11	27	38	—	6	6	11	33	44
Potassium cyanide	—	1	1	2	1	3	2	2	4
Rubber	—	1	1	—	—	—	—	1	1
Shoe cement	1	—	1	—	—	—	1	—	1
Shoe cleaner	1	—	1	—	—	—	1	—	1
Shoe dressing	3	—	3	—	—	—	3	—	3
Silk	1	3	4	—	1	1	1	4	5
Soap	3	5	8	37	17	54	40	22	62
Sodium carb.	2	2	4	3	3	6	5	5	10
Sodium chloride	1	1	2	—	3	3	1	4	5
Sodium cyanide	—	—	—	—	1	1	—	1	1
Sodium hydroxide	3	3	6	10	6	16	13	9	22
Sodium nitrite	—	1	1	—	—	—	—	1	1
Sodium silicate	—	2	2	—	—	—	—	2	2
Starch	1	—	1	—	—	—	1	—	1
Sugar	—	—	—	—	1	1	—	1	1
Sulphur	—	1	1	—	—	—	—	1	1
Sulphur dioxide	—	—	—	—	1	1	—	1	1
Sulphuric acid	—	—	—	3	—	3	3	—	3
Thinner	—	1	1	—	—	—	—	1	1
Toluol	—	1	1	—	—	—	—	1	1
Trauma	—	—	—	1	1	2	1	1	2
Trisodium phosphate	1	1	2	1	2	3	2	3	5
Turpentine	2	1	3	2	1	3	4	2	6
Varnish	1	—	1	—	—	—	—	1	1
Vegetable	3	3	6	—	—	—	3	3	6
Wood dust	2	2	4	—	—	—	2	2	4
Zinc	—	1	1	—	—	—	—	1	1
TOTALS	93	164	257	180	189	369	273	353	626

Table 3. Dermatitis by Cause, 1934. Allowed and Disallowed Cases

Recovery in these patients took from a few days to 13 weeks.[6]

One point not generally considered is the apparent immunity which develops in workers after first being sensitive to materials they employ. It seems that this occurs in those who develop a mild dermatitis only. The workers themselves say that they "become hardened" to the agent. Unfortunately, this immunity lasts only from one week to a month, and on the resumption of work, the "immunizing" process must be repeated.

There is another kind of worker who works for many years without any trouble and then for some unknown reason becomes sensitized and develops

Of course, burns by strong acids and caustics can be readily distinguished, and the primary action of fat solvents which cause the skin to become dry, and the dehydrators which give the skin a scaly, parchment-like appearance, can also be recognized. It can be stated that erythema, edema, papules and vesicles of the exposed parts are characteristic of dermatitis due to external irritants. By the exposed parts, the parts exposed to the eye are not always meant, because the covered parts of the body may also be exposed to the action of penetrating dusts, fumes and liquids. When dust is the irritant, it is well to remember that the belt line, the ankle, and areas exposed to friction are often

involved, especially the back of the neck. Table 8 attempts a simple outline of clinical types.

It is characteristic of a typical case of occupational dermatitis that it appears a short time after the person is exposed to the offending material and that it tends to disappear after exposure has ceased; that is, it will get well if the person stops work for a length of time. It even becomes improved during ing remissions and exacerbations while at work. These cases are difficult to explain. It may be possible that the conditions under which they work are not always the same. The dermatitis itself may exhibit a periodicity due to variations in the resistance of the person or variations in his sensitivity. Focal infections and diet may be contributing factors. There is still another group of cases

CHEMICAL			
	INORGANIC		ORGANIC
ACIDS & SALTS	Sulphuric Nitric Hydrochloric Hydrofluoric Chromic Arsenious Phosphoric	ACIDS & SALTS & ANHYDRIDES	Oxalic Carbolic Cresylic Formic Lactic Acetic Maleic Hydrocyanic Phthalic Abietic
ALKALIES	Sodium hydrate & carbonate Potassium hydrate & carbonate Ammonium hydrate & carbonate Barium hydrate & carbonate Calcium hydrate & carbonate		
SALTS OF IRRITANT MINERALS	Mercury Chromium Nickel Silver Zinc Arsenic Antimony Phosphorus	SOLVENTS	Turpentine Benzol Carbon bi sulphide Carbon tetra chloride Tri chlor ethylene Tetra chlor ethane

Table 4. General Irritants

RUBBER & RUBBER COMPOUNDS	Wild rubber Hexamethylene tetramine Guanadines Tetra methyl thiuram disulphide Phenyl beta naphthylamine Para & ortha toluidine Triethyl trimethylene triamine	PHOTO DEVELOPERS	Paraphenylene diamine Paramidophenol & compounds Hydroquinone Metol (sulphate of monomethyl paramidophenol) Pyrogallol
DYE INTERMEDIATES	Anilin & compounds Nitro compounds Nitroso compounds Di nitro chlor benzol Naphthalene & compounds Anthracene & compounds Benzidine & compounds Benzanthrone & compounds Toluidine & compounds	FUR DYES	Paraphenylendiamine Paramidophenol Aniline black
		FABRIC DYES	Crystal violet Malachite green Auramine Chrysoidine Metanil yellow Chrome mordanted dyes
EXPLOSIVES	Tri nitro toluene Tetra nitro methylaniline Fulminate of mercury Tri nitro resorcin Sensol ($C_2H_8N_{10}$)	INSECTICIDES & FUNGICIDES	Mercury compounds Arsenic compounds Fluoride compounds Nicotine compounds Pyrethrum compounds
LEATHER DYES	Nigrosine Bismark brown	SOAPS	Those containing free alkali Those containing olive oil "foots" Those containing coconut oils Medicated Perfumed
ROSIN, SYNTHETIC RESINS & WAXES	Rosin Wood rosin Burgundy pitch Dammar Phenol formaldehyde resins Urea formaldehyde resins Trichlornaphthalene (halowax) Chlorinated waxes Beeswax Paraffin	OILS, VEGETABLE & MINERAL	Essential oils Sulphonated oils Cutting oils Coning oils Petroleum distillates
		COSMETICS	Containing irritant dyes, oils, perfumes & other chemicals

Table 5. Specific Irritants
(Cause Dermatitis Only in Hypersensitive Individuals)

the week-end holiday. It will reappear upon exposure to the irritant. We think that the best proof that a dermatitis from which the person is suffering is due to his occupation is that it appears when the man goes to work, gets well when the man stops work, and reappears when he goes back to work. This, of course, is the usual picture, but it is not always encountered. Some workers have alternat- in which the primary dermatitis is followed by frequent relapses and finally by a chronic eczema, even after giving up employment. Infections with pus organisms and molds may also occur on top of occupational dermatoses and complicate the picture of the disease. It is very often difficult in such cases to prove that the occupation and not the complication was the original disease.

Diagnosis

THE differential diagnosis from skin diseases due to other causes may be most difficult. The effects of irritating salves may mask the true picture. A detailed and pertinent history is important. In a recent report, of 100 cases presenting themselves for compensation, only 18 were found in which the occupation was the proven cause.[7] In 42 cases of this group dermatophytosis was the diagnosis. The others had a wide variety of dermatoses.

Industrial dermatitis itself cannot be differentiated by its appearance from other venenata or contact eczemas caused by like noxae in the patient's home and outside sources.

POISON IVY & POISON SUMAC	(Rhus toxicodendron & venenata)
PRIMROSE	(Primula Abconica & Primula Sinensis)
POISON OAK	(Rhus diversiloba)
JAPAN LACQUER	(Rhus vernificera)
NETTLE	(Urtica dioica)
SATINWOOD	(Chloroxylon Sinentenia)
BRAZILIAN WALNUT	(Embuia)
BOXWOOD, AFRICAN	(Sereocephalus diderichiae)
COCOBOLO	
SPURGE	(Castor & Croton Oil)
DAFFODIL	(Amaryllidacea)
TULIP BULB	(Liliaceae)
CINNAMON	
FIG	(Urticaceae)
PRICKLY PEAR	(Cactaceae)
ASPARAGUS	
TOBACCO	
CHRYSANTHEMUM	(Pyrethrum flower)
ORRIS ROOT	(Irideae)
HOPS	(Cannabinacea)
CASHEW NUTS	
CARDOL	
VANILLA	
MARIGOLD	(Ranunculaceae)
COW PARSNIP	(Heracleum)
TEAK	(Verbenaceae)
CHESTNUT WOOD	

Table 6. Plants

In the matter of dermatophytids in the present state of our knowledge, inspection alone cannot always be relied on to differentiate them from eczemas of the contact type.[8] Mycological examination of the suspected primary focus and of the "phytids" and culturing of material are usually necessary. Trichophytin and oidoimycin intracutaneous tests may aid in diagnosis. Patch tests should be done, but finally a personal evaluation of each case is necessary. The fungus infection often coexists with the dermatitis. One predisposes the individual to the other and vice versa. Over three times as many fungus infections in employees of a hat factory are found in those engaged in wet processes as in those working at dry processes.[9] Certain industrial conditions undoubtedly tend to influence the number and severity of fungus infections.

The patch test in contact dermatoses may be of diagnostic importance but cannot always be relied upon. It is much superior to the intradermal and scratch tests in this field. The individual's reaction to an irritant by the patch test varies with the degree of sensitization, the strength of the concentration, the actual quantity of the substance applied to a given area of skin, and the duration of the application. Needless to say, care must be exercised in the application of tests. A concentrated general irritant will give positive patch tests on all skins, and on a sensitized individual it will cause actual necrosis. With an unknown or new irritant a question as to whether fellow workers can handle the material with impunity may help one decide whether to patch test without diluting. Dry substances should be moistened with water. Table 9 shows Rudolph Mayer's list of substances and concentrations which on healthy, normal skins cause no reaction in 24 hours by patch test.

BACTERIA	
Bacterial infections of occupational wounds	
Butcher's pemphigus	
Erysipeloid	(Bacillus swine erysipelas)
Horse impetigo	(Impetigo)
Cow pox	(Vaccinia)
Verruca necrogenica	(Tuberculosis verrucosa)
Anthrax	
Glanders	
PARASITES	
Ground itch	(Ankylostomiasis)
	(Miners)
	(Agriculturists)
	(Laborers)
Mange	(Acarus sarcoptea & demodex)
Grain itch	(Pediculoides ventricosus)
Carpoglyphus passularum	(Handlers of dried figs, dates and prunes)
Caterpillar dermatitis	(Horticulturists)
FUNGUS	
Yeasts	(bakers)
Monilia	(fruit handlers)
Dermatomycosis	(Animal handlers), (Fur handlers), (Hide handlers), (Wool handlers), (Barbers handlers), (Bath attendants)
	(Sporotrichosis)
	(Blastomycosis) (Horticulturists)
	(Actinomycosis) (Animal handlers)

Table 7. Biologic Agents

ACUTE DERMATITIS VENENATA OR ECZEMATOZA		Characterized by erythema, edema, papules, vesicles, exudation, crusts, and finally desquamation — usually the result of general and specific irritants.
CHRONIC FISSURED ECZEMAS		Characterized by erythema, lichenification, cornification, fissuring — usually the result of dehydrators, fat solvents, soaps and detergents.
FOLLICULITIS AND ACNE		Characterized by plugged sebaceous follicles and supprative lesions— usually caused by oils, waxes and chlorine.
EPIDERMAL PROLIFERATION	Benign & Malignant	Characterized by keratosis, papillomate and epitheliomata of exposed parts—usually caused by petroleum, coal tar and derivaties, arsenic and anilin.

Table 8. Clinical Types

Another list of irritants which can be used follows:

Di nitro chlor benzol	0.5%*
Amino azo toluene	2%*
Beta naphthol	20%†
Di ortho tolyl guanidine	Pure powder
Di ortho tolyl thiourea	Pure powder
Mono benzyl para amino phenol	Pure
Meta toluyluene diamine	Pure
Michler's Hydrol	5%*
Naphthylamine	2%*
Nitroso di ethyl aniline	1%*
Phenyl alpha naphthylamine	Pure
Platamine black	Solid powder
Para nitro benzoic acid	Pure
Phenyl glycine	Pure
Tetra methyl thiuram mono sulphide	Pure
Tetra methyl thiuram di sulphide	Pure

* Alcoholic solution. † In olive oil.

A much larger list of this sort will be reported during the present year. Although the patch test may be negative at the end of 24 hours, any erythema or other process developing at the site in the next few days still makes the test positive and indicates hypersensitivity.

The failures of the patch test and the sources of false positives or negatives must be always considered. Controls are of value because the purity of the irritant used for testing may be in doubt and one may get false positives with benign concentrations due to impurities. When we are ignorant of the strength of the irritant, controls are necessary. We must always bear in mind the fact that hypersensitivity may be localized. In general, clear areas of the skin near the site of the eruption are the best for testing. Sulzberger and Keer[11] cite a patient whose contact dermatitis due to face powder had a positive patch test on the V area of the neck and chest anteriorly while a patch test on the back was negative.

The patch test may again be negative because it does not represent or simulate actual working conditions. Friction may be necessary to produce the dermatitis. Also, there may be sensitivity to an irritant which will not appear by patch test for reasons which cannot be explained. Sometimes heat, or ultraviolet radiation must coexist. It seems that chlorophyll dermatitis is produced with red ray irradiation plus chlorophyll.[12] Photodynamic activity is important in oil of bergomat dermatoses and melanoses due to coal tar and petroleum derivations.[13] The above being so, we can only submit more strongly than ever to the feeling that the most practical and important test is that of exposing the man to actual working conditions. If every time the man works he develops dermatitis, and every time he stops he gets well, his job is certainly a causative factor of his condition. The following are a few cases in point illustrating various types of industrial dermatitis:

CASE 1. Mr. P. B., an Italian, aged 48, was a cement mixer and brick layer's helper. His dermatitis was on the face, neck, hands, forearms and legs, and had been present for two months. Patch tests, wherever applied with cement and other materials that he worked with, were negative. On inhaling the dust from cement and exposing himself to it a dermatitis could be produced. A direct rubbing of the cement on the previously affected areas produced a dermatitis.

This case illustrates local sensitivity and, secondly, shows how friction and a better simulation of occupational conditions were necessary to produce

Wearing Material

Feathers, fur, animal hair, plants, typewriter ribbon, leather—small pieces 1.5 by 1.5 cm., slightly moistened.

Materials Used in Arts

Urea, ammonium sulphate, potassium nitrate, sodium nitrate, all in 10% solution.

Materials Used in Washing

Persil, washing soda, sidol, sodium hypochlorite, calcium chloride; all in 10% solution.

Acids

Hydrochloric acid, 1%; sulphuric acid, ½ of 1%; nitric acid, .2%; boric acid, pure or moistened; sulphurous acid, .2%; chromic acid, ½ of 1%; formic acid, 1%; acetic acid, 3%; benzoic acid, 1% in alcohol solution; sodium hydrate, ½ of 1%; Soda, Na_2CO_3, 10% solution in water; ammonia, 1%; borax, saturated solution.

Woods

Pine, oak, hemlock, teak, satin, ebony, powdered and moistened.

Bleaching Powder

Pure and moistened.

Aromatic Oils in 1% Alcoholic Solution

Citron, peppermint, bergamot, etc.

Alkaloids and Similar Substances

1% watery solution.

Resorcin

1% watery solution.

Soaps

Hard soaps and soft soaps—small moistened piece.
Benzine, 60% in olive oil.
Benzol, 60% in olive oil.
Toluol, 50% in olive oil.
Xylol, 50% in olive oil.
Carbon bisulphide, ½ of 1% in olive oil.
Trichlorethylene, 50% in olive oil.
Mineral oil, 60% in olive oil.
Petroleum, 20% in olive oil.
Tar, asphalt, pitch—pure, and painted on the skin without adhesive.
Turpentine, 50% in olive oil.
Esters, such as amyl acetate and butyl acetate, pure.
Acetone, pure. Alcohol, pure.

Colors and Color Bases

Shoe and leather colors, 50% in olive oil.
Complete oil colors in tubes should be used pure. Other oil colors, 50% in olive oil.
Water colors, pure. Mineral colors, pure.
Printer's inks and colors, 60% in olive oil.
Anilin, 2% in olive oil or vaseline. Anilin, methylanilin, dimethylanilin and nitrobenzol, 10% in olive oil. Diazonium salts, 1% in vaseline. (Diazonium salts are used in the preparation of azo colors.)
Ursol, amidophenol and their homologues, 2% solution in vaseline.
Photographic developers, 5% watery solution.

Reagents

Methylorange, phenolphtalein, 2% alcoholic solution.
Esbach's Reagent, Nylander Reagent, Sulphosalicylic acid, 10% water solution.

Disinfectants

Bichloride of mercury and mercury oxycyanate, 1% watery solution.
Formalin, 10% watery solution.
Carbolic acid, 2% solution.
Liquor cresolin, ½ of 1% solution.
Naphthalin, pure.

Miscellaneous Salts

Sulphur nitrate, 3% watery solution.
Copper sulphate, 10%. Nickel sulphate, 10%. Iron sulphate, 10%. Potassium bichromate, ½ of 1% watery solution. Potassium permanganate, 10% watery solution. Calcium nitrate, 10%. Ammonium chloride, 3%. Ammonium nitrate, 10%. Ammonium fluoride, ½ of 1%. Sodium fluoride, ½ of 1%. Sodium sulphide, 2%. Common salt, 10%. Potassium chloride, 10%.

Table 9—by Rudolph Mayer. Patch Test Materials and Concentrations Which Should Give No Reactions in Normal Individuals After 24 Hours

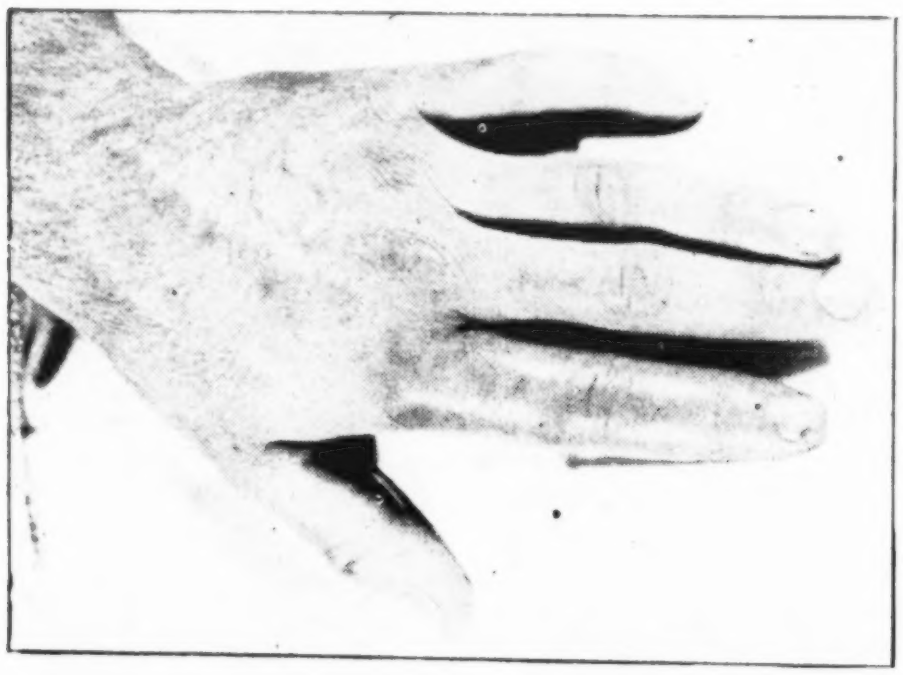

Fig. 1. Erysipeloid infection caused by the bacillus of swine erysipelas in a meat handler. (Case of Dr. J. V. Klander.)

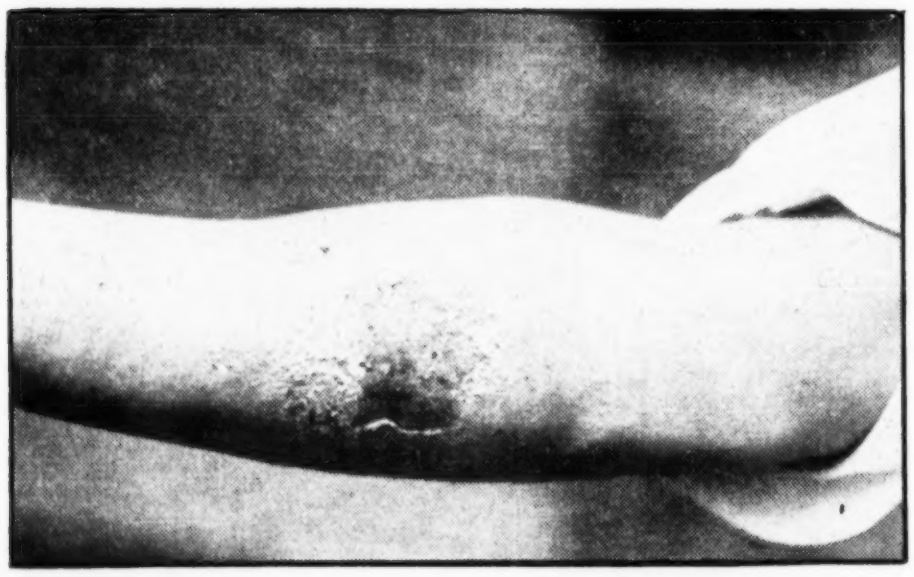

Fig. 2. Soap dermattis in a dishwasher.

Fig. 3. Dermatitis caused by dinitrochlorbenzol, an intermediate dye used in the manufacture of sulphur black.

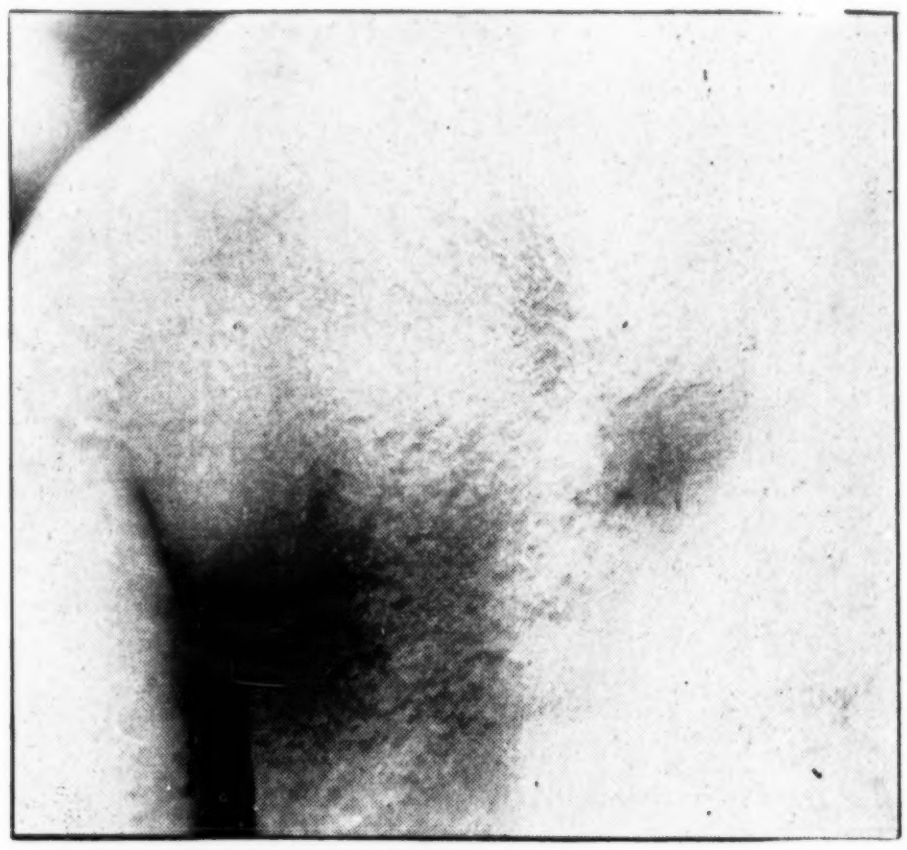

Fig. 4. A "dust dermatitis" due to a synthetic intermediate dye occurring in a worker in drying ovens.

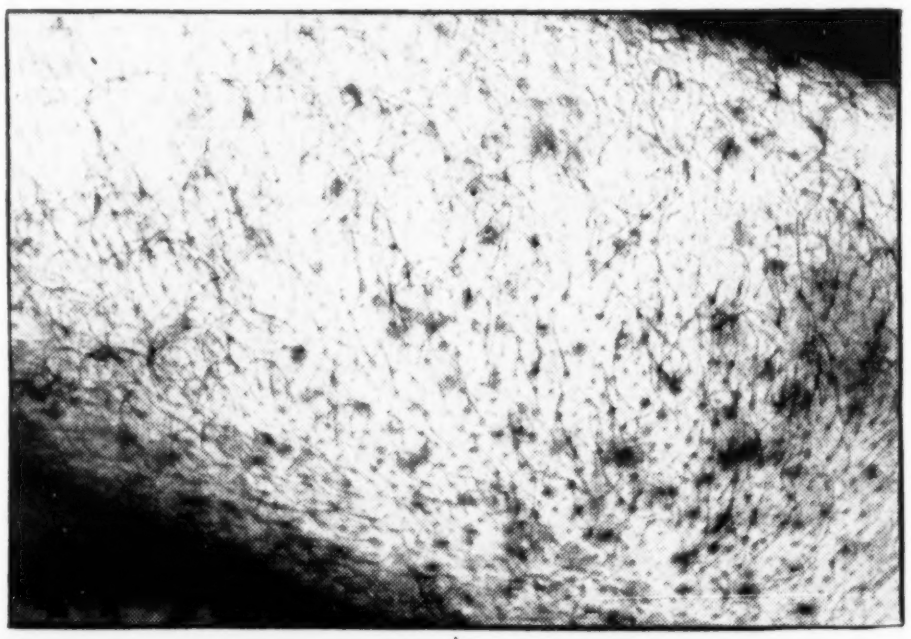

Fig. 5. Mineral oil folliculitis of the thigh caused by oil saturated clothes.

Fig. 6. Synthetic dye worker with an acute "oleum" dermatitis or burn.

a positive test, and shows the failure of the patch test due to two factors.

CASE 2. Miss B. G., aged 27, was a manicurist employed as such for many years. She presented a dermatitis of the palms and fingers, of four weeks' duration. Patch tests which were done on the back with lemon shampoo, permanent wave lotion, and nail polish remover, exhibited positive reactions at the end of 24 hours. The patient discontinued her work, and with emollient applications to the affected areas, the eruption disappeared within three weeks. Upon returning to her usual occupation, there was a prompt recurrence.

This case illustrates the not unusual presence of multiple sensitivity to irritants.

CASE 3. Mrs. B. D., a woman aged 29, a stenographer, presented an eruption on the back of both hands. Nine months previously she had had a similar eruption which disappeared with treatment. The present outbreak was of one week's duration. Patch tests on the back, with carbon and typewriter ribbon were positive. Treatment with Roentgen rays and emollient pastes, together with the discontinuance of her occupation, resulted in a clear skin in six weeks.

The repeated attacks with confirmatory diagnosis by means of positive patch tests are of interest in this case.

CASE 4. J. M., a dishwasher in a restaurant used home-made soaps. He is an example of localized sensitivity proved by positive patch tests on the forearms, hands, and sites near the affected areas (hands and forearms). These tests were negative on the back.

CASE 5. Mr. A. G., aged 27, was employed as a soda fountain clerk, and was exposed to silver polish, scouring powders and soaps. The fingers of both hands (six in all) exhibited paronychia and onychomycosis. A microscopic examination and a culture revealed a monilia infection. Patch tests for his occupational contacts were negative. Nevertheless, this man's condition should be considered of occupational origin. We have seen several similar conditions in those exposed to wet and irritating solutions. We believe such conditions predispose strongly to fungus infections. Undoubtedly, abrasions and traumatism contribute as predisposing factors. By discontinuing his occupation and with local therapy, there was an early regression of his skin condition.

CASE 6. Mr. Z. P., aged 49, was a furrier. This is a case of localized sensitivity to fur and fur dyes. The duration of the skin eruption on both hands was three years. The eruption disappeared while the patient was away from his occupation and promtly reappeared when he returned to it. Patch tests done on his back were negative, but were positive locally. This man's history of recurrence during his occupation is the most positive test of occupational dermatitis.

CASE 7. Mrs. A. M., aged 25, though not an industrial dermatitis case, is nevertheless of interest as a contact dermatitis case secondarily infected with fungus. The patient exhibited the dermatitis in the area where she wore a wrist watch. The test with a leather strap proved to be positive. Her feet exhibited a fungus infection, as did also the area of the dermatitis by culture. Since seeing this case, we have also seen a similar dermatitis in a man who wore a wrist watch, which was not complicated by a fungus infection. Up to date there have been 30 or 40 similar cases in New England.

It is interesting to review the steps necessary to decide which element in these straps is the true etiolical factor. The manufacturer of the watches secured the wrist watch straps from a manufacturer in another city who informed us that the leather from which he made the straps came from a jobber in another town some 100 miles away, and that all he did to the leather was to immerse it in his dyes, a thinner, and a lacquer. This lacquer, purchased from a chemical company in still another city some 200 miles away, was of unknown composition to him.

The next step was to visit the jobber from whom the strap manufacturer bought the leather. The jobber stated that he in turn bought the leather from still another jobber in a city several hundred miles away, who was no longer in business. However, the leather was traced to the tannery in which it was made, through marks of identification on the leather. The tannery stated that the leather had been tanned by them seven years before, and was a chrome tanned leather on which a vegetable dye was used to give it the yellowish color. A sample of the dye was obtained from the tannery. We already had samples of the leather obtained from the jobber and the strap manufacturer.

The next step was to visit the chemical factory in which the dyes, the thinner, and the lacquer which the strap manufacturer used were made. From them we obtained the exact composition of each of the samples, and we proceeded to expose the leather to each of these chemicals in turn. As a control we obtained chrome tanned leather from another manufacturer and subjected it to the same chemicals. The watch manufacturer got 100 of his employees to volunteer for patch tests with these materials. Fourteen patches were put on each individual and left on 72 hours. Those that reacted to the patches were further patch tested with the different ingredients of the particular substances to which they reacted. In this way the actual ingredient was found that had caused the irritation. The work as yet unfinished seems to incriminate the thinner. It may be due to a combination of leather plus thinner.

Treatment

A PERSON who is sensitive to the material with which he works and cannot develop an immunity or "become hardened" to it should seek some other occupation. The dermatitis, if uncomplicated, should disappear when a worker is away from the substance which has caused it. It is rarely that cases of chronic, incurable eczema can be positively traced to an industrial irritant. Most cases of industrial dermatitis develop on new employees or on employees exposed to a new irritant, and are usually mild in character. Such workers should not be taken off the job. It is much better to give them a protective ointment, protective clothing, and let them continue to work. In general, workers who do not develop an immunity should be taken off the job and placed in some other occupation, if possible. When the diagnosis is known in selected cases, the use of the Roentgen rays in fractional, non-filtered doses often speeds the convalescence. The coexistance of fungus and pus infections necessitates measures to treat the dual or complicating disease at the same time. Attention similarly must be turned to constitutional factors. The elimination of a focus of infection is sometimes followed by a clearing up of a persistent eczema.

Heavy Chemicals

DERMATITIS in this industry occurs very frequently. Acid and alkali burns are common, and many of the chemicals have an irritating action because of their acidity. Such cleaning agents as tri-sodium-phosphate and metasilicate of soda act as irritants on the skin of workers handling them. Burns with choride of zinc, sodium fluoride, and soda ash are common among workers handling these products. Many of these substances cause irritation of the nasal mucosa and even perforation of the septum. Chromic acid and its compounds, the fluorides, the cyanides and some of the compounds of arsenic are examples of such substances.

Synthetic Dye Manufacture

VERY few of the finished dyes are general irritants. If they were, people could not wear dyed goods. A few of the dyes, such as paraphenylendiamene, bismark brown, auramine, saffranine, crystal violet, malachite green and anilin black, do cause dermatitis among a small percentage of workers handling them and also among hypersensitive people who wear materials dyed with them. We have found that dermatitis apparently caused by dyed goods was often due not to the dye, but to the finish used on the goods. These finishes consisted of sulphonated oils, some of which are not properly neutralized; also of compounds of formic acid. Many of the intermediates used in the manufacture of synthetic dyes are irritants. The sulphonic acids of the various organic compounds which are intermediates in synthethic dye manufacture contain sufficient sulphuric acid to cause dermatitis. Dinitrochlorbenzol is probably the worst irritant in synthetic dye manufacture. Many of the workers are highly sensitive to this product.

Many of these intermediates are also sensitizers, i. e., exposure to them for a length of time will cause a previously immune person to become hypersensitive. This is especially true of the nitro and the nitroso compounds. In the manufacture of synthetic dyes, the men who handle the filter presses, the flaking machines, the dryers and the grinders are especially exposed to irritants. The older machinery caused more exposure than the modern installations. The newer types of plants are so constructed so that the process is totally enclosed, there being no contact with irritating materials from the raw to the finished product. Containers are emptied by suction into tanks, and these tanks communicate with kettles by means of pipes, and their contents can be interchanged simply by turning a valve. The kettles are provided with suction ventilation so that when they are opened, fumes are drawn away from the opening. Filtering of materials is done in totally enclosed continuous suction filters which discharge their product into drum dryers, which in turn discharge their product into totally enclosed grinders from which the final product is poured into barrels. In such plants the incidence of dermatitis is very small.

Leather Tanning

THE most serious health hazard in leather tanning is, of course, anthrax. Fortunately, it is of rare occurence. The chemicals used in leather tanning are frequently the causes of dermatitis. The chromates cause dermatitis and ulcers. Lime, sodium sulphide and arsenic are used as unhairers. They also cause dermatitis. Sometimes, sumac is used as a tanning agent, and hypersensitive workers develop a dermatitis from it. The leather dyes are often blamed for causing dermatitis, but actually they rarely are at fault.

Rayon Industry

THE two principal forms of rayon manufacture are the viscose method and the cellulose acetate method. In the viscose method, wood pulp is exposed to sodium hydrate, which softens and swells it. This product is then shredded and stored for ageing. It is then submitted to the action of carbon bisulphide in a revolving drum, resulting in a compound called cellulose xanthate. This is dissolved in a solution of sodium hydrate, forming a substance called viscose. The viscose is forced through revolving orifices called spinnerettes into an acid solution which precipitates the cellulose and forms the rayon thread. The thread is spun and spooled and then bleached, combed, dyed and woven into rayon material. The viscose is also forced through narrow slits into the precipitating solution to form sheets of cellulose called cellophane. Dermatitis occurs among the men handling the spinnerettes, due to the action of the acid solution into which the viscose is forced. Viscose is highly caustic and burns the skin if not quickly wiped off. In bleaching rayon, chorine is extensively used and dermatitis sometimes results from the bleaching solution. The coning oil, consisting of sulphonated vegetable oils, also causes dermatitis in susceptible workers.

Bottle seals are also made of rayon, and have caused dermatitis among handlers of wet rayon bottle seals.

Acetate rayon is made by an entirely different process. Cotton linters are subjected to the action of glacial acetic acid and acetic anhydride and sulphuric acid. The resulting jelly-like substance is saponified and then neutralized and the cellulose acetate is precipitated by washing with water. After drying, it is dissolved in acetone and then forced through spinnerette machines and wound into threads. No dermatitis occurs but cases of burns from the acetic acid are very common.

In preparing silk for weaving and knitting, called silk throwing, dermatitis occurs among the girls who handle the wet silk. This is due to the wetting solution which often contains a high percentage of soap. The soap is the actual irritant.

Systemic poisoning by carbon bisulphide and hydrogen sulphide occurs at times among workers in rayon. Carbon bisulphide may be breathed when cellulose xanthate is made and hydrogen sulphide is liberated over the precipitating tanks. In making cellulose acetate, acetone jags occur at times in the hot filter rooms.

Linseed Oil

WE HAVE investigated outbreaks of dermatitis among workers in linseed oil. Dermatitis in this industry can be caused by the sharp seed points in the linseed oils; by parasites; by oils of mustard and rape which contaminate the linseed, and by the filter mats used, which are made of human Chinese hair.

Miscellaneous

IN CANDY making, the sugar and the essential oils used for flavoring are causes of dermatitis. In the maufacture of formaldahyde, hexamethylenetetramine, the dermatitis usually occurs

among men working in the dryers. In explosive manufacture nearly all the materials used are irritants. Ground glass, oxidizing agents, like potassium chlorate, manganese dioxide; explosives like fulminate of mercury, T. N. T., lead azide, lead styphnate, tetryl, dinitrotluene, are examples. Workers with lead styphnate have their hair and skin turn yellow, very much as if it was dyed with picric acid. Workers with a new explosive called sensol, the formula of which is a secret, often develop dermatitis. Most of these substances, however, are not irritating to everyone, but only to certain individuals.

Dermatitis occurs among the makers of insecticides. The insecticides used for spraying trees and vegetables are usually lead arsenates. Last summer these substances were used in an effort to destroy a plague of grasshoppers in the northern part of the United States and resulted in an outbreak of dermatitis.

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Lymphatic Leukemia

AT THE time of his death in January, 1931, Kizer was 59 years old. Until December, 1930, his general health had been good, although for several years previously he had varicose veins in both legs. Sometime in December, 1930, red spots, varying in size from a dime to a quarter, appeared on both of his feet, some of his toes were swollen, and at times the varicose veins pained him, but he did not consult a physician. On Jan. 12, 1931, in the course of his employment, he bruised the calf of his left leg. The following day he had to cease work and go home. He never worked thereafter. On January 16 he went to a clinic, where it was ascertained upon examination that he had a white cell count of 119,000 per cubic millimeter and "hemorrhagic bleeding" under the skin of the calf of the left leg at or near the point where it had been bruised. On January 19, "hemorrhagic bleeding" appeared under the skin of the calf of the right leg. The following day the bruise or red blotch on the calf of the left leg was improved and was "fading out" but the blotch and "hemorrhagic bleeding" on the right leg were worse. On January 27 Kizer was found in a stupor, with partial paralysis. He was taken to a hospital, where he died that day. His blood count on his entrance to the hospital was over 400,000 per cubic millimeter. After autopsy, death was attributed to acute lymphatic leukemia. Claiming that death was due to complications arising from the bruise on his left leg, received in the course of his employment, his widow sought compensation under the Nebraska compensation act. From a judgment of the district court, Lancaster County, affirming the refusal of the compensation commission to award compensation, the widow appealed to the Supreme Court of Nebraska.

For the claimant to recover compensation, said the Supreme Court, she must show with reasonable certainty that the workman's death was caused by injuries resulting from an accident arising out of and in the course of his employment. This, the court concluded, the widow failed to do. The testimony of medical experts called by the employer and his insurance carrier amply sustained the conclusion reached by the commission and by the lower court. These experts testified that medical authorities are unanimous in the opinion that trauma can neither cause acute lymphatic leykemia nor aggravate it. These experts denied that the bruise on the workman's left leg, received on January 12, in any manner caused or contributed to his death on January 27. Only one medical expert, called by the widow, testified that the trauma was a contributing cause of the death. The Supreme Court accordingly affirmed the judgment of the lower court denying compensation to the widow.

* *Beatrice Creamery Co.* v. *Kizer* (Neb.) 254 N.W. 690—*J.A.M.A.* (January 19, 1935).

Hernia from a Medicolegal Standpoint

By H. I. SMITH, M.D.

THE subject of hernia as considered from a medicolegal and especially compensation standpoint has been the source of much controversy. This article purports to deal with facts developed from anatomical relationship of structures revealed on the operating table and research handling the developmental phase of the subject from embryonic to adult life.

The term hernia simply means a protrusion of tissue through an opening in the cavity where it is confined. Being derived from a Greek word meaning branch or offshoot, it readily denotes the hernial projection. The general varieties of hernia are inguinal, femoral, umbilical, lumbar, retroperitoneal, sciatic, obturator and diaphramatic. They are also typified by their contents. Anyone of the general varieties of hernia may be, and in the majority of instances are due to congenital defect. Therefore, we must consider the question of origin from a congenital or acquired standpoint. The entire subject is too voluminous to attempt for this

consideration a discussion of each of the above varieties of hernia. Suffice it to say that, generally speaking, claims for hernia are accepted as compensable where we are thrown into a position where we must say an accident might cause such a condition. This is true of all types of direct hernia. It is the writer's opinion, however, that many direct hernia also are paid for by industrial compensation-paying concerns that have their origin early in life or are congenital. This opinion is based upon the history given by many patients suffering from this type of hernia which do not reveal the symptoms one would necessarily expect following the sustaining of a traumatic hernia. This, I believe, is especially true of the direct inguinal type of hernia.

We will, therefore, deal chiefly with the indirect inguinal type, also called oblique inguinal hernia. This is the particular type of hernia where surgeons who have given thought to the matter are sometimes at loggerheads with legal forces handling and arbitrating these matters.

This hernial projection takes an indirect circuitous route leaving the abdominal cavity through the internal inguinal ring, which lies approximately on a level with the anterior superior spine of the ilium or the point of the hip. It passes downward obliquely through the inguinal canal, through the external inguinal ring and may reach the bottom of the scrotum, in which event it is called a complete indirect inguinal or scrotal hernia. It may reach to any point on this route and form an incomplete indirect hernia. The extent on the route described varies with the degree of obliteration of the processus vaginalis of the peritoneum. In this type of hernia authorities such as Watson and others agree that there is a preformed sac; in other words the hernia is pre-existent and of congenital origin, in that the loop of the peritoneum passes down with the descent of the testicle before birth as the processus vaginalis of the peritoneum. The testicle in the embryo lies in a retroperitoneal position within the abdomen. It is, of course, covered by the peritoneum and as the period of gestation terminates at or near birth, the testicle descends into the scrotum. The peritoneal covering passes with the testicle drawing with it a tube-like projection, processus vaginalis, and reaches the bottom of the scrotum at or shortly after birth, the tube like projection which has been drawn down with the testicle through the inguinal ring and canal soon becomes obliterated. The portion of peritoneum directly covering the testicle becomes one of its permanent coverings, tunica vaginalis. In instances where the tube like projection or the processus vaginalis remains patent; that is, it is not obliterated, a congenital hernial sac is present, and is at any period during life subject to the admission of intra-abdominal contents such as the omentum, intestines, etc. Increased abdominal strain associated with numerous other conditions may at any period cause the congenital sac to be filled or partially filled with such abdominal contents. On the other hand, an individual may go through and live a life time with the congenitally patent processus vaginalis and never be cognizant of the fact that he has a hernia. Unless some contents of the abdomen is forced into the sac he will never be aware of its presence.

Due to the indirect route assumed by this type of hernia, it is the general opinion from a surgical standpoint that it is impossible for this type of hernia to be caused by trauma. The most important factor in this belief is the fact that the inguinal rings act as valves or tend to close or lessen the aperture when the intra-abdominal pressure is increased. With a pre-existent hernial sac, however, the pressure can be and is increased to the extent that the abdominal contents will overcome this valve like function and be pushed into the sac.

To conceive of pressure forcing out a loop or tunic like sac, is in my opinion from a medical standpoint, an impossibility.

With an abnormal abdominal wall characterized by congenital defects such as separation of fibres, imperfectly formed fibres, etc., increased pressure may force out the abdominal contents with a saculation of the peritoneum, but when this occurs, it passes directly through the tissues forming a direct hernia. The saculation is globular and not tubular, a distinctly different form of sac from the indirect type.

Following an operation, there are two methods which may be employed to ascertain definitely and prove whether or not the sac is congenital. In the first place where a sac is found along with cord structures and becomes a definite part of the cord of funiculus, it is evidence of a pre-existing condition. . Were a sac pushed out later it would lie as a separate entity from the cord rather than an integral part of it. In this instance it would more likely be adherent to the surrounding walls rather than the cord structure. In the second place microscopic examination will reveal in pre-existing and congenital hernial sac a connecting tissue with the fibrals running parallel with the walls of the sac and continuing over the cord but separated from the surrounding structures, in other words a type of connective tissue which develops with the growth of the body. If the sac were recently pushed out the connective tissue would be of different type entirely. Watson states that the sudden appearance of hernia is accompanied by pain, swelling and edema and usually ecchymosis of the hernial coverage. This is another diagnostic feature if operated early. The indirect hernia is seldom operated early. The imediate symptoms attending their discovery are seldom stormy. The reason for this is the fact that usually a small amount of contents enters the preformed sac at first. As more contents gradually enter, the noticeable external mass becomes larger.

The patient believes, and honestly, that he sustained a rupture when he notices a mass in the inguinal region externally. This process may be accompained by some pain caused by stretching the peritoneal walls of the preformed sac. Tension on the walls of the peritoneum causes intense symptoms. Reaction can be noticed on the patient fairly well anesthetized. Knowing this, one can readily realize the conditions that follow a traumatic hernia, very few of which have ever been recorded.

From an industrial compensation standpoint, it is plain that the indirect inguinal hernia sac is of embryonic or congenital origin and is always present when the processus vaginalis, through a developmental defect fails to become obliterated. When patent, it is a part of the peritoneal cavity.

The abdominal viscera and contents are not stationary or fixed. The mesentery fastens the bowel very loosely allowing a large range of motion within the abdominal cavity. When a portion of the abdominal contents enters this patent processus

vaginalis or preformed hernial sac, it can no more be said that this change in position is the original formation of a hernia than if the abdominal contents are shifted to any other recess in the peritoneal cavity.

Occupational Diseases

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AN OCCUPATIONAL disease is an affliction which is the result of exposure to an industrial health hazard, while an industrial health hazard is any condition or manner of work that is unnatural to the physiology of the human being so engaged. This physiology is adaptable through gradual tolerance to quite wide variations in environment and experiences, but the rule holds absolute that subjection to conditions which are unnatural to the physiology, including the adaptability of man, results in pathology or disease. It has recently been suggested by Cannon, of Harvard University, that the ability of the body to adjust itself be called "homeostasis."[1]

How Are Occupational Diseases Classified

SPECIFIC OCCUPATIONAL DISEASES: These are the afflictions which rarely, if ever, occur outside of industry itself. Specific occupational diseases are fairly common but only rarely are deaths directly due to them. In certain industries, such as the manufacture or repair of storage batteries, a specific occupational disease like lead poisoning may have a high incidence. It should be noted, however, that these diseases are very apt to be the beginning of other afflictions and to pass into chronic, partly occupational diseases. The diagnosis itself or knowledge of the place of origin usually indicates that they are occupational. Any doubt is expelled if upon investigation the occupational hazards which are known to produce the affliction in question are actually found to exist.

Practically every health hazard may produce a specific occupational disease, but the total number of possible hazards is easily grouped under ten headings, as follows:

(1) *The poisons,* such as lead, shown by definite signs like colic, headache, anemia, weakness in the hand-grips and in the wrists, with perhaps a blue line on the gums, etc.

(2) *Mechanical irritants,* such as dust, producing dermatitis or, when inhaled, a group generally called "pneumoconiosis," which is literally defined as "lung dust disease," of which the most specific is silicosis, the one due to breathing silica dust, that is, quartz or sand dust; and another, "asbestosis," due to breathing asbestos dust, etc.

(3) *Friction,* such as constant pressure against parts of the body as by rubbing, producing caloused places, worn teeth, or certain bony overgrowths; or bursitis, such as "housemaid's knee," etc.

(4) *Fatigue,* especially of a certain part of the body, due to the self-made movement often repeated, or prolonged strain; for instance, tenosynovitis which is now a compensable disease in Ohio when it occurs in the wrist tendons due to overuse, as in shoveling or in rotating movements, and even in typewriting, etc. In fact, the British pay compensation for "writers' cramp." Fatigue also produces, in time, certain deformities, neuroses, and nervous breakdown.

(5) *Infections,* of which there are not many peculiar to industry itself, but there occur anthrax from handling hides and wool, glanders from the horse, lumpy jaw from cattle, lockjaw from industrial wounds, "machinist's boils" due to getting oils, greases, and cutting compounds on the skin, and even typhoid fever, undulant fever, and tularemia, where such occur as the result of exposure on the job.

(6) *Diseases following accidental injuries at work,* such as infections, deformities, and fibroses, which become, therefore, occupational diseases. The Massachusetts Supreme Court, indeed, has held that total incapacity due to a latent disease, like syphilis, reawakened by an injury and resulting in insanity, must be compensated. But most of the diseases following injuries have been the result of secondary infection because the injuries were not given prompt first-aid treatment at the time they occurred.

(7) *Illumination afflictions,* such as "glassworker's cataract," and inflamed eyes from witnessing electric flashes; or prolonged work in deficient light, producing an affliction known as "nystagmus" or "dancing pupils," largely a disease of coal miners who work in gassy mines where only safety lamps, which usually give poor illumination, can be had.

(8) *High temperature,* producing thermic fever and conducive to heat stroke; or *low temperature,* producing local afflictions, such as frost bites, and general afflictions consequent upon chilling the body and resulting in congestion in certain organs or parts followed by pneumonia, Bright's disease, etc.

(9) *Noise,* especially reverberating noises, which in time produce so-called "boiler makers" deafness."

(10) *Abnormal atmospheric pressures,* producing the various forms of compressed-air-illness that occur in tunnel workers, deep sewer workers, building foundation workers, etc., where the air is put under high pressure in order to keep water and mud from suddenly engulfing the workers, who therefore have to work in the compressed air. Or sudden *concussions* occur in some jobs, producing ruptured ear drums. Or *rarefaction,* as in aviators or work in high mountains, producing giddiness and perhaps temporary unconsciousness in the aviator, and so-called "mountain sickness" in the others. This condition is found to be due not to the reduced atmospheric pressure itself but to the thinness of the air, resulting in a low state of oxygen available for breathing, and hence is best met by breathing of oxygen carried as an accessory supply.

Without question, all specific occupational diseases should be studied with a view to eliminating their causes, that is, the specific health hazards which I have just enumerated. In this connection, it is my opinion that it is neither necessary nor wise to prohibit the use of dangerous substances, or to cease work in dangerous places; in fact, such prohibition would stop even the use of fuel gas, or motor gasoline, and most things which characterize our industrial age. In fact, prohibition of these

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* In *Timely Tidings on Tuberculosis,* Lima, Ohio, September, 1935.
1. *Am. Jr. Med. Sciences,* January, 1935, pp. 1-15.

risks or hazards would undoubtedly be declared unconstitutional under the laws of our country. In certain instances, however, where articles of questionable utility such as matches or fireworks containing dangerous yellow phosphorus, or radium watch and clock dials, are the issues, and where other suitable substitutes can be used, prohibition might constitutionally obtain. Measures taken under the pure food and drug act are illustrations. A better method, amounting to prohibition is that of control by agreements, which are occasionally brought about in industry to discontinue the use of dangerous substances or methods even though substitute methods may be a little more expensive. The most usual method, however, consists in effective health regulations set up to control the hazards present so that work may go on as usual, but workers are protected. This was the adjustment made in the tetraethyl lead question, and has worked out very admirably, as very few workers or others are now poisoned with this substance, which is, nevertheless, so extensively used in gasoline for motor fuel.

All specific occupational diseases should be fully compensated by payment to the afflicted persons and the payment of medical bills, etc., and it is to be regretted that a considerable number of our states, including Ohio, have adopted the British or European method of scheduling only certain specific occupational diseases for compensation and refusing to compensate others. Thus, in Ohio, at the present time, a worker may have his eyelids irritated on the outside by a given dust or vapor, producing a dermatitis, and draw compensation under Item II. on the compensation schedule, but if the inside of the lids or the eyeball is afflicted by the same substance, he cannot be compensated, since the law only applies to skin surfaces and not to mucous membranes. Thus the law practically splits hair and makes the eyelashes the dividing line. In a similar manner, silica, when inhaled and producing silicosis, a lung disease which may permanently disable a worker with great distress of breathing until he ultimately is gradually asphyxiated or develops pneumonia or tuberculosis and dies, is not compensated in Ohio, but if handling the fine silica dust produces an inflammation of the skin, that is, a dermatitis, he is eligible for compensation.

It seems to me, therefore, that the only fair method, so far as compensation is concerned, is to have a so-called "blanket" law which provides for the compensation of all true or characteristic occupational diseases, and to leave the matter of determining the diagnosis and the facts in a given case to an impartial board composed principally of physicians who specialize in occupational diseases and industrial hygiene, to determine the merits of the given claim. Also, the scheduling of only certain afflictions as occupational diseases is most unfair as, for example, in Ohio, compensation for carbon bisulphide poisoning is permitted, but not for hydrogen sulphide poisoning. Law is presumed to be based upon reason, and such distinctions as I have named are not reasonable, and the law should be changed accordingly, as our workers have no recourse to the courts to assist them, nor can the Industrial Commission aid them.

Of the compensable occupational diseases, 1415 were reported last year in Ohio, the chief ones being dermatitis 913, tenosynovitis of the wrist 228, lead poisoning 162, chrome ulcerations 43, bursitis of the knee 27, and eight other afflictions with smaller figures.

Of the non-compensable group, 141 were reported—silicosis and other respiratory dust diseases 54, and the balance widely scattered. Thus, 1556 occupational diseases were reported in 1934, 327 occurring chiefly through inhaling the substance, 933 by way of the skin, 228 through strain, 27 through friction, and 41 through other means.

Of the 8769 physicians registered in Ohio, 626, or 7.1%, sent in 1422 of the reports. Since May, 1913, a total of 17,443 occupational diseases was reported to the end of 1934.

Diseases Partly Occupational

THESE are afflictions where the hazards may exist elsewhere than in connection with the work, such as faulty personal hygiene, bad living conditions, etc. For example, tuberculosis can, at most, be no more than partly occupational in nature since the disease is due to a specific germ that spreads in households or through milk or food and otherwise, yet, tuberculosis in the general population is today about the seventh in decreasing importance in the causes of death, but a recent extensive study by Jessamine S. Whitney, of the National Tuberculosis Association has shown that it is the second cause of death in the industrially employed—heart disease coming first, and our Ohio statistics have shown that among female workers in mechanical and manufacturing industries, the tuberculosis death-rate is six times as high as among males employed in the same pursuits. In a similar way, many other diseases of the human body may be partly occupational in nature, but it will probably be some time before these afflictions can be evaluated sufficiently closely to permit a general agreement in regards to their compensation. However, this group of diseases will be greatly decreased in number if only sufficient attention is given to the hazards which produce the specific or characteristic occupational diseases, since the elimination of the common well-known hazards will practically eliminate all of the others, and the diseases which follow in their wake.

Occupational Health Complaints

THAT is, pre-disease conditions which are shown as headache, inability to sleep, dyspepsia, constipation, diarrhea, aches, pains, numbness, weakness, cramps, stiffness, tiredness, itching or burning of the skin, colds, coughs, etc. These are only symptoms and in themselves are not true diseases, but they are the fore-warners or "ear-marks" of disease. Hence, in industry or work, the closest attention should be given to these symptoms and every possible industrial hazard which might produce them should be eliminated. If this were done, no occupational disease of any character would follow. Here, the value of simple health inquiries among employees and physical examinations held, for example, periodically, would quite well suffice to prevent occupational diseases.

Conditions

THESE are neither diseases nor complaints, but things which may be advanced by one's occupation. Postural defects, such as flat feet, round shoulders are examples; or habits or method-defects which waste energy, such as constantly nod-

nodding the head in rhythm with the motion of the hands. These conditions constitute no real impairment, as a rule, but should not be allowed to exist or should be corrected as far as possible when found to exist.

The more remote effects of occupational diseases are reflected in lack of efficiency and production, in uncalled-for dependency of the worker, shortened life expectancy, and reduced national vitality, while occasionally they result in extended controversies and expensive lawsuits, and large awards, which are not justified. In fact, the application of common law procedures to medicine is invariably difficult and expensive, and, after all, leaves the questions involved to be settled by juries composed of lay persons who can have little or no qualifications to pass upon the intricate medical evidence presented by the plaintiff and the defense.

On the other hand, enough is known about industrial health hazards to control them quite completely and to keep their effects below the threshold of producing occupational diseases, and this is the better procedure, and is the true aim of industrial hygiene.

Pneumokoniosis

and Its Social Effects

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THE physiological aspects of pneumokoniosis in relation to its effect on the present economical and social status of the employer and employee have become a very important problem.

Many studies have been made of diseases of the lungs caused by dust; and extensive work has been done in an effort to determine the etiology, pathology, and diagnosis of the lung conditions; but very little attention has been given to the effects of the degree of disability on the industry, the employee, the employee's family, and society.

The ill effects of inhaling dust while working at a dusty occupation are not a recent discovery; the earlier medical writers[1] knew something about the harmful effects of dust.

The importance of this subject is emphasized by the number of commissions lately formed to study the conditions dealing with dust and health and by the number of articles on pneumokoniosis[11]—silicosis, asbestosis, anthracosis, etc.—that have appeared recently in medical literature. It is also interesting to note that in cases concerning dust ills brought before the courts of several states, industry has received a verdict of adverse character. All this reflects the trend of social thought, and, in turn, points out that disease due to the inhalation of dust at one's occupation concerns not only the employee and his dependents, but also the industry and society.

The severity of the diseases varies somewhat with the different kinds of dust, fumes, gases, and mist in the atmosphere, and, on account of the wide distribution of the industries which subject one to these hazards, the diseases vary in different localities and in different industries.

Investigators now agree that various kinds of dust, fumes, gases, and mist are capable of causing pathological conditions of the respiratory apparatus but that an inhalant that contains silica produces a severe form of pneumokoniosis, called silicosis, which is characterized by fibrosis within the lungs, and which disease can completely incapacitate or render the victim susceptible to other respiratory diseases.

SILICA in its different forms comprises better than half of our earth's composition. It is found in all animal and vegetable life; it gives form to the hulls and husks of different grains, and to the leaves and stocks of the various grasses, weeds, and vegetable plants. It occurs as almost pure silica in opal and amethyst. Quartz and flint contain a very large amount of it, and it is found in all sandstone, gravel, and granite.

Since it is found so abundantly in its various forms and combinations and is so widely distributed over the surface of the earth and throughout our constructive and destructive enterprises, it is obvious that people who work with the different products of nature are more or less exposed to dust which contains silica; and this explains the reason for so many industries being concerned with this subject.

Throughout the various stages of industrial development, dust has been somewhat of a hazard and a hygienic problem for the industries. The use of modern machinery for rapid cutting, pulverizing, and polishing has produced dust in enormous quantities and this, along with the present trend of economical and social conditions, has so widely introduced the subject of pneumokoniosis that it has become the outstanding hygienic problem of the day.

THE length of time an employee works at a dusty occupation before pneumokoniosis develops to a dangerous stage, or before it is severe enough to warrant a change in occupation, depends upon the amount of dust inhaled, the chemical composition of the dust, the fineness of the dust, the susceptibility of the person, the anatomical condition of the upper respiratory tract, and the working conditions. Formerly it was thought that 15 to 20 years were required to produce a serious condition, but recently, by investigations and the study of cases by the roentgen rays, it has been found that under certain conditions some cases may take several years and under others, where the dust is very fine and in large amounts, and the employee has little resistance, the time may be reduced to a few years.

For a long time physicians have been advising certain patients to work in less dust. In recent years some industries have shown a willingness to cooperate with them by installing, from time to time, modern preventive measures. But, on the other hand, it is impossible entirely to eliminate the dust, fumes, gases and mists from all industries and still carry on the business of the enterprises. This means that many industries contain more or less hazardous occupations and, therefore, it remains for society, the industry, and the employees to cooperate for the best interests of all.

When society considers the preventive and compensative measures it should also consider the fact that the more the protection and the greater the compensation offered, the greater the burden on the industry. Since the states, instead of the federal government, make the compensation laws, occupational diseases are not similarly recognized by the various states. Some do not recognize occupational diseases at all. Others award compen-

sation or benefits according to the degree of disability and the amount of suffering of both the worker and his dependents. Those states that do not recognize occupational diseases teach little or no protective health measures and employ little or no preventive and protective measures. This creates an unequal cost of production in some industries and in different states. The incentive to protection and preventive measures is, and always will be, in direct proportion to the difference between the first cost of the preventive measures and the consequences — the costs and culpability — which are determined by the amount of the verdict as a measure of damage awarded by juries under common law suits, the workman's compensation law, or by society attempting to legalize preventive measures.

In some states industry recognizes the importance of healthy employees in its plants because it means more efficiency and fewer accidents. Many have been teaching first aid and accident-preventive measures. Through this teaching, the average worker, though he himself might not be injured or get sick as a result of his working conditions, regards the accident and preventive measures as his own immediate concern and often places the culpability of the whole scheme of hygiene upon his employer, the industry. These acts are often evidenced by the demands upon industry for protective measures or compensation for injury received by the employee or one of his fellow workers in the course of employment.

In the past, fatal accidents, because of their inevitable publicity, have been given more thought and attention than occupational diseases, especially those which develop insidiously like pneumokoniosis, which as a rule occurs little by little, day by day, out of sight and mind of the public. Therefore, society has been slow to adjudge industry and make demands for preventive measures in this particular condition. But, recently, on account of the present social and economical trend, society is strongly asserting itself by awarding court verdicts against industries in cases of pneumokoniosis from occupational dust exposure.

An important condition from an economical and social standpoint is the fact that the present economic depression has caused considerable reduction in employment, especially in the constructive industries that are always attended with dusty occupations. A large number of the unemployed have been exposed to dust. Since some states do not recognize occupational diseases they have not employed very many protective and preventive measures and, therefore, in these states exposure has sometimes been very extensive.

With the return of prosperity, the labor influx in the various factories, mills, and mines will carry more or less hardship for the industry, the operators, and society. It is questionable how many of these unemployed will return to their former occupations and how many will be compelled to seek employment in other industries of their own state or of other states. The moving from one state to another expecting to find employment will add to the social problems. Many will not be accepted because of their physical conditions. Because of the present social and economic unrest, with society demanding more protective measures for its workers, some states that do not now recognize occupational diseases as a compensative condition will do so in the future. This will prevent many of the unemployed exposed from obtaining employment in the states where occupational diseases are compensable, leaving them to seek employment elsewhere, which will add to the perplexity of the problem, with many of them on the verge of poverty and dependency. Some will find their way into similar industries, some into dissimilar industries—factories, mills, and mines. This unfortunate situation will result in disaster to the self-insuring industries if they do not protect themselves by carefully examining the applicant before hiring. They will be very likely to receive in their employment some very dangerously-exposed persons with pneumokoniosis, possibly tuberculosis, or both, for which they may be required to assume responsibility for all of the exposure whether or not the worker received it while in their employ.

For this reason it is strongly recommended that a roentgen examination be given at the time the applicant is being considered.

The industries that depend upon outside compensation coverage—may find it very expensive, if not impossible, to obtain proper coverage for certain occupations. At the present time some insurance companies are unwilling to cover certain occupations. There seems to be an increasing confusion concerning the unstable condition of the subject of pneumokoniosis. Recently a company[2] found it necessary to reinsure all of its employees. All were discharged and re-employment took place after a health survey was made. Some affected were not re-employed. Legal proceedings were commenced against the company. The supreme court ruled that it was a matter for legislation and not for the courts, and further ruled that no disability was suffered by the employees within the meaning of the law during the period of their employment nor until after the relations of the employer and employee had been terminated and, therefore, the employees were not compensable.

THE last occupation is not always the one actually responsible for all of the trouble. The person may have had pneumokoniosis when he was hired. He may have contracted it during some occupation of short duration, and on account of frequent changes in occupation the one that caused the exposure was forgotten. But if the industry does not know the condition that existed when it hired him, it may be required to assume responsibility for all the existing conditions.

A radiogram, made when the applicant is being considered and kept as a record, appears to me to be a decisive way to show the condition that existed when the worker was hired and the progress of the condition during employment.

Subsequent roentgen examinations will show when the danger point has been reached. Roentgenograms will also aid in detecting tuberculosis, and, by eliminating the tuberculars, the other workers within the plant will be protected. Roentgenograms may be the means of detecting tuberculosis at a time when the applicant does not know that he has the disease, and may give him a chance for recovery by receiving early treatment. Furthermore, he may be enabled to protect his family by affording them information so that they can use preventive means against infection. Roentgenograms can be used in the future as a deciding evidence to aid in the establishment of the

degree of disability compared to the amount of pneumokoniosis that the applicant had at the time he entered employment.

The day of specialization is here. The companies wish experienced operatives. In gaining experience the worker, while learning, may have been subjected to exposure to dust which resulted in his contracting a corresponding amount of pneumokoniosis. Hence, one of my reasons for recommending an examination of all applicants who expect to work in dust or who give a history of working in dust, or when tuberculosis is suspected and when a history is given which reveals contact with tubercular patients.

Tubercular applicants who expect to work in dust should be ruled out. The inhalation of silica dust can activate tuberculosis,[3] and those suffering from this disease have fewer chances of recovery if silicosis is present along with the tuberculosis. Some courts have ruled that tuberculosis activated by silica dust is compensable.[4]

As a rule, a person with silicosis continues at his occupation without knowing that he has the disease until he ultimately contracts tuberculosis or pneumonia which causes the condition to become progressively worse and probably incapacitates him for further work.[5] Frequently an acute respiratory condition such as bronchitis or influenza aggravates a silicosis condition that has been lying dormant for several years, and the worker does not recover as quickly as he should, with the result that silicosis is for the first time discovered and usually is accredited to the last occupation of the patient. Society should not adjudge an industry for wrongdoing until it has been shown that the industry is at fault. If damage to the worker's lungs has occurred, the source of exposure should be definitely established, because, as has been previously explained, an employee may have worked in a dangerously dusty industry for only a few years, and have developed silicosis and, because of his frequent change of occupation or its short duration, the occupation is forgotten or is not considered important by those in charge of employment, and the applicant is hired. The new occupation may be silica-free and in no way responsible for silicosis, but still, if there is dust present, the industry may be adjudged responsible for all damage. Again a worker who has been exposed to silica dust at a certain occupation, either knowingly or unknowingly, applies for similar employment in another industry which has the necessary preventive measures, or possibly on account of its location may have a silica-free atmosphere, and again an innocent industry may be adjudged and held responsible for all of the damage.

BEFORE an industry, an insurance carrier, or the courts can render compensation measures, certain facts must necessarily be established. They must be furnished with decisive information, so they can award the compensation as prescribed by the compensation laws. They must be shown that actual damage to the lungs has occurred, and what damage has been done. Also the degree of disability that is present and the amount that is likely to continue permanently must be determined. The condition of the claimant's chest at the time he began the alleged responsible occupation should be offered as a deciding influence to those administering compensation measures. To show that the occupation really did cause the condition, or to show that an occupation made an existing condition worse, should also aid the compensation administrators.

Roentgenograms of the claimant's chest made at the time he began the occupation and at the time he left the occupation, or at the time the exposure was stopped, should, along with other information, aid in settling the dispute.

But it must be remembered that stopping the exposure by removing the worker to a dustless occupation does not always stop the progress of the disease. As a rule it does, but it has been proved that sometimes it does not.[6] The disease may keep on progressing, especially, if the person is subject to frequent attacks of bronchitis or if he falls ill of pneumonia or influenza. This has been proved in the writer's experience.

Whether or not certain occupations aggravated a previously-existing condition is difficult to determine unless there is some record of the condition which existed when the worker began the occupation. Whether or not a condition developed while at a certain occupation is also difficult to determine unless a record of the condition that existed at the time the worker began the occupation can be shown.

WHEN we consider that silica is capable of producing a severe form of pneumokoniosis, and that other dusts and mixtures of dust cause somewhat different pathological conditions, and that silica and mixtures of silica and other dusts vary in amounts throughout our various industries which are widely scattered throughout the country, it becomes obvious why one authority said: "Even clinicians experienced in examining cases from one industry may not be qualified to express opinions upon cases in other dusty industries,"[7] and explains a reason for differing testimonies being offered in these cases. Those interested in testimony may be interested in knowing that many who have had special training and experience in roentgenology have a certificate from the American board of radiology which was formed in 1933. The board is made up of 15 members, all recognized authorities on radiology who were appointed by the various radiological societies. The board conducts examinations for those who wish to qualify as to their ability and competency to practice radiology or one of its branches. A diploma from the board indicates that the holder thereof has had certain training and experience and has satisfactorily passed the examinations of the board and satisfied them as to experience, training, competency, and other qualifications which they deem necessary in order to practice radiology or one of its branches.

The physical suffering of one afflicted with the disease, and his inability to work, with the resulting reduction in his wages, and, perhaps, the possible destitution of his dependents, plus the fact that the afflicted worked at a dusty occupation, usually furnishes grounds or reasons for claims for compensation; but, frequently, lack of evidence by those in charge of the case, including the industry, the physician, and the employee or his dependents is the cause of compensation disputes. Sometimes claims are filed against an innocent industry by some unscrupulous person, and there-

fore it behooves the insurance carrier to seek all the information possible so as to aid in awarding the compensation as provided for by the compensation laws. Sometimes, when the insurance carrier, the industry, or the courts request sufficient information to justify them in settling a claim, or to aid them in awarding a fair and adequate compensation, a just claim is insufficiently presented and the claimant suffers, the blame being shifted onto those attempting to administer the compensation. Hence, another reason for keeping records, histories, and roentgenograms as outlined herein, and considering them along with the clinical aspects of the dispute between the claimant and the defendent.

MOST of the records of physicians, hospitals, and industries pertaining to pneumokoniosis do not usually give the information necessary to settle a compensation dispute. The value of good records is evidenced by the inconvenience often experienced when an attempt is made to obtain records after the claim has been entered for trial. Physicians' records are generally kept for their own therapy requirements and not for tracing the cause or origin of the disease. The same thing may be said of hospital records. They give general information, but not enough detail as to the amount of dust inhaled or the kind of dust encountered in the occupation, the hours of exposure, and the various occupations that the patient had, with the exact duties of each one.

Often pneumokonioses is obscured by tuberculosis or pneumonia for which the patient was admitted to the hospital, and these often appear on death certificates because they are considered the active causes of death. For these reasons it is possible that there may be considerably more cases of pneumokoniosis in our country than our records indicate.

I believe that records made when an applicant is being considered can be made to be of considerably more value to both the employer and the employee.

Records should be made of the various previous occupations, not just what company the applicant worked for. The records should clearly show the exact duties of each occupation, not the name of a general occupation. They should indicate the number of working hours per day in the dust, and the exact number of days—not just how many years of work and whether or not the occupation was a location of the plant, not just the name of the company; the hygienic conditions of the occupation and, if possible, whether respirators were used and what kind of respirators. All this will, when the time comes, help to arrive at a fair settlement of compensation disputes, and will be useful when considered along with the roentgenological examination and clinical findings.

SILICOSIS is characterized by irritation, congestion, and fibrosis within the chest; as the fibrosis develops it encroaches on the air cells, air passages, and lymph and blood vessels, with a corresponding decrease of or interference with lung ventilation and a reduction in constitutional capability for muscular activity — "exercise and work." Uncomplicated silicosis rarely kills the person unless the exposure has been extensive, but it usually leaves him susceptible to other diseases which may cause him to die earlier in life than his fellow workers who do not develop silicosis. It can also, by causing a partial disability, result in a reduction in earning power with a corresponding amount of suffering to himself and his family. Silicotics are subject to frequent attacks of upper respiratory colds, bronchitis, and other diseases, but the most common danger is an extraordinary susceptibility to tuberculosis which completely incapacitates the worker and usually progresses rapidly towards death. Seventy-five percent of those afflicted with silicosis ultimately develop tuberculosis.[8]

In the year 1916, when the Pennsylvania Compensation Law went into effect, this writer made a health survey of several hundred employees for a large self-insuring corporation. The chests of the employees were examined both clinically and roentgenologically. Many of these people were stricken with influenza in the epidemic which occurred in the fall of 1918. A number of them were again examined in 1921, and just recently some were further examined, and others will be as they are located. The results of these examinations are of value, but out of the scope of this paper. I expect to report them later. However, evidence was sufficient to indicate that influenza caused some of the cases of pneumokoniosis, "which were not interfering with their health and ability to work," to flare up and become progressively worse and cause a few to become incapacitated. Other physicians have reported similar conditions.

EVEN though it is impossible to remove all the dust from some industries it appears that it is up to the industry to meet the increasing demands that are being made upon it in this respect by society or to accept the consequences. While it is impossible to eliminate entirely the dust from certain occupations, industries can do much towards preventing pneumokoniosis from developing among their employees to a dangerous stage. They can make a health survey of their workers to determine the condition of their chests, determine how many have pneumokoniosis, how many have tuberculosis, and how many have both diseases. A roentgen examination will show the amount of fibrosis, and its anatomical location. It will show the design or pattern of the fibrosis. Roentgenograms will aid in the segregation of the tubercular from the non-tubercular, so that those who have silicosis may not be subjected to the dangers of contagion. A health survey will aid in determining whether or not more exposure will be harmful, and if the worker should be transferred to some other work. It will show the exact state of affairs, so that more serious trouble may be guarded against. Subsequent examinations will show the progress or development of the condition after the survey was made.

After the general health survey of the employees the question arises of what to do with those having silicosis or pulmonary tuberculosis, or silicosis and tuberculosis. Discretion must be used in handling these cases. To discharge all of them would invite litigation[2], but, on the other hand, those having pulmonary tuberculosis become a hazard to their fellow workers. It would not be wise to allow a tubercular person to continue working among other employees, especially if some of them have silicosis, because it has been

irrefutably proven that silicotics are susceptible to tuberculosis, and tuberculosis contracted by a silicotic usually means the beginning of a rapidly-progressing disability and a premature death.

To tell tuberculars of their condition may invite some criticism, but not to tell them would deprive them of necessary treatment and the chances of recovery. It would also deprive their families of precautionary preventive measures. If tuberculars continue at employment for the industry, medical treatment should be started at once. Periodic examinations are advised. Roentgenograms offer reliable aid in determining the progress of the disease. Follow-up roentgenograms ought to be of similar density, detail, and distance technique for comparative purposes.

Those having only silicosis in the early stages, without pulmonary tuberculosis, present a different problem. They will not infect their fellow workers, but they have a strong tendency towards the contraction of pulmonary tuberculosis, pneumonia, and acute respiratory colds.

As a rule, silicotics who have not as yet contracted pulmonary tuberculosis are healthy looking and able to carry on the duties of their occupation. More exposure to dust may or may not be harmful, but here it should be remembered that removal of the exposure does not always stop the progress of the disease.[6] A transfer to a less dusty occupation may be indicated.

A careful study of the roentgenograms as to the amount of fibrosis, the anatomical location of it, and its structural design may aid in determining whether or not the patient should be transferred to a non-dusty occupation or be allowed to remain at his regular one.

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Mule Spinners' Cancer

THE MANCHESTER Committee on Cancer,* formed in 1925, is representative of all the hospitals and public health authorities in the city. Its major work has been the establishment of a laboratory unit in the university, primarily for investigating the causes and prevention of mule spinners' cancer, so alarmingly prevalent in the cotton mills of Manchester and the neighboring towns.

Increasing incidence of mule spinners' cancer began to be noticed about 1908. This led to the appointment by the government of a special committee of investigation.

In 1926 it was reported that the death rate from this form of cancer in cotton operatives was 137 for spinners and 72 for other cotton workers, while the mean national rate was four per million living males. It was found that spinners' cancer was due in part, if not entirely, to mineral oil. The Manchester committee therefore undertook an investigation as to the possibility of purifying the mineral oils likely to cause cancer. The results have now reached a practical stage. The amount of work done by pathologists, chemists and physicists in the investigation during the nine years is enormous.

As reported previously, the director of the Cancer Research Laboratories, Dr. C. C. Twort, has been able to lay down a specification for lubricating oils that should reduce the risk of cancer to a minimum. The precancerous conditions of the skin due to handling mineral oils are now being almost altogether prevented by the precautionary measures recommended. These observations constitute the first real preventive work in cancer that has been effected in this country and, so far as is known, in the world. A similar line of investigation is now being carried out in relation to tar compounds and concern gas-tar workers, distillers, tarmac road workers, and others. Considerable evidence has been collected to show that the increased incidence of cancer of the lung is associated with contamination of the atmosphere by smoke.

Some mineral oils were found to be more carcinogenic than others, but all, other than white oils, such as, medicinal liquid petrolatum and the lighter boiling spirits, were potentially carcinogenic. Textile oils were the most carcinogenic; these were considerably more than the heavier internal combustion engine oils. The animal test of carcinogenicity is lengthy, laborious and expensive. To avoid these difficulties, the chemical and physical characters of the oils were investigated and the results proved to be of the greatest utility, allowing oils to be condemned or recommended. The refractive index and the specific gravity were the test of greatest value and allowed animal tests to be dispensed with entirely. As a prophylactic against industrial cancers, an ointment composed of equal parts of wool fat and olive oil gave the greatest protection. It is recommended that all parts of the body likely to come in contact with the suspected material should be smeared with this before work is begun. After work the parts should be washed with soap and water and carefully dried, a little of the ointment being again rubbed in.

* London Correspondent, *J.A.M.A.*, (Februay 9, 1935).

Industrial Medicine

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A Classic Precedent

THE importance of comparable statistics of the cost of illnesses and injuries in examined and unexamined groups of employees, and their presentation in terms of days lost and dollars cannot be over-rated.

The survey made by *The New York Times* Medical Department and published in these pages (617-641) is an outstanding achievement in this respect, and a fortunate, and exemplary, lead-off in a direction in which many medical departments will follow.

The article deserves, and will be given the most careful study by industrial physicians. Its comparative figures, as all too briefly summarized by the author, are enlightening and convincing.

The employees appear in five groups. The two main classifications may be called the "examined" and the "unexamined," the latter designated as "No PX." The "examined" are subdivided into four groups, as follows:

A—Physically fit. No defects.

B—Physically fit. Defects of a minor nature, such as bad teeth, tonsils, etc., that could be easily eliminated to leave the individual in Class A standing.

C—Physically fit. Defects of a fixed nature that in no way interfered with the expected longevity and usefulness of an employee, such as loss of a limb, one eye, healed fractures, etc.

D—Physically unfit. Defects that either decreased the normal life expectancy or interfered with the duties of the employee. Any history or sign of tuberculosis, ulcer, gall bladder disturbance; heart, kidney, or mental disease.

The employment of individuals in the "D" group was sufficient to furnish very valuable information "when their medical experience has been contrasted with that of individuals in the other groups."

The data on these five groups are related to three consecutive periods: first, the 10 years, 1921 to 1930, inclusive; second, the year 1931; and third, the year 1932.

In all cases the figures are actual accurate and authentic; their presentation sets forth the experience exactly as it was; the tables are expressions of facts found.

The article as a whole is undoubtedly the most complete and authoritative analysis of actual cost figures of this kind ever to appear in print. Its importance and value, presented in their entirety in continuous sequence in these pages, well justify the use of practically the whole of the magazine to make it easily, completely and permanently available.

The author's conclusion (p. 641) is classical in its calm assertions of the demonstrated findings of this survey. It is destined to be very widely quoted; certain of its sentences embody the solution of many problems which industrial physicians are sharing, in these times, with industrial executives, and into the handling of which the figures of this survey will come with the utmost of timeliness and usefulness.

We start the conclusion of this article on its long career of being quoted, by quoting it here:

"A medical examination preliminary to employment can be fairly done as is evidenced by the experience in the various groups herein given. Prediction of the average loss of time for individuals of different physical fitness can be fairly accurately made. Factors, such as the depression, materially influence a medical rating. Further experience may definitely place such factors.

"The acceptance of applicants in all physical groups of individuals is the ideal for which every medical department should strive. Refusing to employ an increasing number of physically inferior individuals, although they can work, will surely lead to increased social responsibilities that can be avoided.

"Reducing the expenses or costs of all groups to a known figure can readily be done by ordinary rating up or rating down to a common level each individual applicant upon the physical findings. This would enable any employer to accept all applicants, that were able to work, on a fixed basis of percentage time loss. The benefit payments can be figured accordingly so that each individual may be expected to receive the same relative benefit under any plan.

"Preliminary medical examination occupies the interests of labor, the employer and the medical fraternity. Whatever position the first two may take, it should not deter the medical profession from taking the stand that sufficient medical experience can be worked out to enable the insurance companies to construct a plan that would permit every one able to do his job to be employed on an equitable basis with respect to benefit plans."

It is difficult to emphasize one sentence more than another; the temptation is to italicize all of them. But there is one sentence which, on this basis, is entitled to *super*-emphasis. It is:

"The acceptance of applicants in all physical groups of individuals is the ideal for which every medical department should strive."

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LORENZ BOHLER has long been internationally famous for his many successful developments in methods for the treatment of all kinds of fractures. The German editions of his book are well known in America, but their use has naturally been restricted by the limitations of language. Even a fair reading knowledge of German is not sufficient for a complete grasp of principles or a reliable understanding of details of technique. Many American surgeons have wished for a complete and reliable English translation of Dr. Bohler's work, and one is now ready. Not only a complete translation of the fourth German edition, but added material, not previously published, from Dr. Bohler's latest experience with Fractures of the Spine, and of the Neck of the Femur. Not a dull machine-like translation by an uncomprehending literary hack, but a work of appreciation done by a man who is himself a well known master-surgeon. Ernest Hey Groves, editor of the British Journal of Surgery, an authority on fractures who deliberately postponed revision of his own excellent book on the treatment of fractures in order to pay tribute to the Viennese master of the art, and make his work better available to all English-speaking surgeons. It has been well said that Dr. Bohler's book reveals he has that quality of genius which consists in the infinite capacity for taking pains. **All of** his painstakingly acquired knowledge and experience is now available to every American orthopedist and general surgeon.

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No surgeon should rest content until he has a copy of Bohler on his bookshelf for reference, for comparative purposes to aid him in improving his own methods and technique. The book is a liberal education in fracture treatment.

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Industrial Medicine and Surgery

Importance of Industrial Hygiene—How It Can Best Be Handled Through State Departments of Health

MY DISCUSSION* of industrial hygiene will be concerned principally with the effect of industrial environment on health. The effect of an unhealthful working environment was recognized by some of the fathers of medicine even before the beginning of the modern factory system. But the most impressive evidence of the effect of an unhealthful working environment is probably the morbidity and mortality statistics developed by Dublin in 1929 as the result of a study of three and a quarter million wage earners. Although his results have been presented before and are doubtless familiar to many, they show such a clear picture of the widespread effects of an industrial environment on the health of the worker that a few of the more significant conclusions are presented. Dublin's figures include a wide variety of industries, both those which are especially productive of occupational disease and also those which present no outstanding health hazard. The life expectancy of the industrial worker was shown to be seven less than that of those otherwise engaged. Age for age, their mortality rates were from one and a half times to more than double the rates for the nonindustrial worker, and he concludes that while heredity and innate differences play some part, probably the most important factors are the conditions incident to industrial employment such as toxic gases, dusts, specific occupational disease, extreme temperature variations and numerous other industrial hazards.

Tuberculosis rates are much higher in the industrial group and add to the cases in the general population, and rates for pneumonia and degenerative diseases are much higher in the industrial group.

The numerous investigations of the United States Public Health Service and other health agencies, both here and abroad, have established that morbidity and mortality rates are definitely higher for the general industrial population and that certain occupations are of first importance as factors in the causation of excessive sickness and mortality of the general population. Impressive as these statistics are, they do not tell the whole story, for frequently individuals working in an unhealthful environment on becoming affected leave their employment for some other work which does not affect their health. A high labor turnover may be the only indication found in some plants in which dangerous conditions exist but in which the incidence of occupational disease is reported as low.

In these days of modern production industry uses a vast array of materials and processes that will affect health if not properly controlled. New materials are constantly being added and their effect on health is frequently not known. Processes become well established and injury to health may occur as a result, for unfortunately the conditions predisposing to occupational disease in many cases are not immediately evident. Various agencies have done much splendid work in accident prevention in the last few years, but occupational diseases are not like accidents in which cause and effect may be clearly defined. They are not so attention compelling; their development is gradual and may appear only as increased labor turnover or decreased production. The effect on the individual is not so self evident and the cause of the condition is not so readily recognized.

There is nothing particularly arresting in the gradual loss of power in the hands of those absorbing lead; nothing to stimulate the interest, no startling appeal in the slowed gait and mental peculiarities of those exposed to certain solvents, in the development of anemia and tiny hemorrhages in those exposed to other poisonous materials, or in the gradual development of fibrosis of the lungs from exposure to certain dusts. The onset is gradual and the change imperceptible from day to day, until the individual either leaves to be replaced by another worker who passes through the same cycle or remains at work under progressively lessened efficiency for a greater or less time, dependent on how much of the material he has absorbed. The body is capable of wide adjustment to environment, and much harm may be done before evidence of the condition is noted.

The 1930 census shows that 15,000,000 people in this country are employed in manufacturing and mechanical industries and in the extraction of minerals. There are nearly a thousand occupations in these industries, the materials, processes or conditions of which are hazardous to health unless properly controlled. Aside from the effects on health, the economic implications are tremendous, for these conditions affect the earning capacity of a large part of the productive population.

WESLEY M. GRAFF, director of conservation of the National Bureau of Casualty and Surety Underwriters, representing 40 casualty companies writing annually $100,000,000 worth of compensation insurance, in a paper before the state and provincial health authorities at their last meeting, said:

"In the last few years occupational disease claims have grown at an alarming rate. They represent today one of the important problems of industry. . . . It is no exaggeration to say that the financial life of many of our most important industries is at stake and that it will be lost if measures are not taken to remedy the conditions causing occupational disease."

After citing the tremendous increase in insurance rates and amounts paid for compensation, he continued:

'The figures I have presented relate primarily to compensation costs. There are other, and perhaps greater costs with which you as health authorities are more familiar than am I. Those are the indirect losses which are the resultants of disease. They include the waste involved when life expectancy is shortened, with the cost to the state when morbidity and mortality rates increase due to inadequate preventive measures. The economic waste resulting from occupational disease may be greater in proportion than that accruing from the usual run of diseases, due to the fact that the wage earner is the one primarily disabled. Impairment of the wage earner's health may affect the general welfare and health of his family. I leave it to you to evaluate the costs to the state which are to be superimposed upon those for compensation which I have presented to you. From an economic point of view alone, the occupational disease problem is one of commanding importance."

Within the last few years, consciousness of the importance of maintaining a healthful industrial environment has developed among physicians, health authorities, insurance interests, labor and industry itself. Go through any of the recent volumes of The Journal or the programs of recent meetings and note the increased attention being given to occupational disease. The same is true of the journals and the programs of the annual meetings of the American Public Health Association, of the National Safety Council and of the technical societies such as the American Society of Mechanical Engineers and the American Institute of Mining and Metallurgical Engineers. The trade magazines of the various industries in which occupational disease conditions are found are carrying papers on these subjects. The literature on the subject is growing so rapidly that it is difficult to keep abreast of it. Recognition of the importance of occupational disease is becoming widespread, and the time has come to institute a constructive program for its control.

Control of conditions so seriously affecting such a large group of the productive population cannot properly be undertaken except by an agency experienced in disease control. The control of communicable disease has always been recognized as a function of the health department. This control is purely for prevention of disease and death.

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*ALBERT S. GRAY, M.D., Director, Bureau of Occupational Diseases, Connecticut State Department of Health, Hartford, Conn.; read before the Section on Preventive and Industrial Medicine and Public Health at the Eighty-Sixth Annual Session of the American Medical Association, Atlantic City, N. J., June 12, 1935; *J.A.M.A.*, October 12, 1935.

Occupational disease control represents exactly the same close relationship to the health of the adult population as communicable disease control does to the health of the child population.

A COMPLETE program for occupational disease control cannot be undertaken by industry itself. While a few large corporations with laboratory facilities, technical personnel and full time medical directors have done some splendid work for those engaged in their specific plants, the vast majority of industry has not the facilities. Industry is not a health department; it is not to be expected that it assume the attributes of a health department. Industry conserves and increases the monetary assets of the state, health authorities and the medical profession its human assets. The state has a definite function to perform in the protection of the health of its people which it cannot abrogate or allocate to any other agency. Occupational disease control is a public health problem of the first magnitude requiring the cooperation of industry, the medical profession and the public health authorities for its solution.

In his presidential address at the meeting of the American Public Health Association, Haven Emerson said:

"We surround the babe unborn with premonitory protection, deal wisely and gently with infancy and childhood, and then hurl the product of a reasonably healthy youth into a maelstrom of blind chances of dusts, fumes and fatigues which wear down the stoutest body and cripple the most willing worker. . . . I would persuade you to seize and occupy the largest field of preventive medicine, until now excluded from the work of official health organizations in this country. I refer to the prevention of occupational diseases. . . . Let us have the courage to create a division, an office, a sphere of influence in every health department to be concerned with occupational disease. . . . Let us incorporate within the permanent functions of health departments protection of employed persons against health handicaps inherent in the place and nature of their work."

At the same meeting a resolution was passed that:

"Unhealthful occupational environment constitutes an important and widespread cause of increased morbidity and mortality among the large group of wage earners and among the general population.

"Resolved, That it is a function of the department of health to include as an intregral part of a complete public health program the protection of the population against health hazards resulting from unhealthful working environment . . . and recommends to each state health department of an industrial state the establishment of a bureau or division of occupational diseases or industrial hygiene under the supervision of a physician trained in public health and industrial hygiene, with adequate technical and laboratory facilities and personnel, empowered to make investigations of working environment, for the control of industrial health hazards and the prevention of occupational diseases."

At the meeting of the State and Provincial Health Authorities of North America a resolution was passed stressing the importance of unhealthful occupational environment and resolving to take action to start an occupational disease prevention program.

Wesley M. Graff, in his address before this meeting said:

"It is the health department which is concerned with mortality and morbidity rates, and, if faulty industrial conditions increase those rates, both for diseases not specifically occupational and also for the specific occupational diseases, such as silicosis, asbestosis, benzol poisoning, lead poisoning, etc., the power to prevent disease should rest with that department. It is our belief that within the department of health there should be a bureau or a division specifically charged with the prevention of occupational disease."

A controlling mechanism has been built for the prevention of communicable diseases by the use of instruments of precision and exact methods of control and employment of trained personnel — epidemiologist, sanitary engineer, bacteriologist — and necessary laboratory facilities and personnel.

This branch of medicine is now in a position to build a controlling mechanism for the prevention of occupational diseases. The prevention of occupational disease necessitates the application by specially trained technical personnel of precise physical and chemical procedures to conditions affecting health in industrial environment. It is impossible to tell by mere inspection whether any particular environment is safe, whether the dust or other toxic material in the air of a workroom is present in sufficient quantities to constitute a hazard or whether the illumination is adequate or the ventilation sufficient.

The effect is known of many of the potentially hazardous materials and processes used by industry on health. For many of them the smallest amount (threshold dose) that will affect health is known. Precise methods have been developed by which the exposure to these materials may be measured to determine whether this "threshold dose" is exceeded and a hazard to health presented. There are methods by which exposure to these materials can be controlled if exposure is found to be excessive.

The personnel of the health department organization for occupational disease control should be made up of men trained in the various phases of industrial hygiene. The director should be a physician possessed of a broad conception of all phases of the problem, trained in the recognition of occupational diseases, familiar with industrial processes and their effect on health, capable of interpreting the results of studies of working environment in terms of occupational disease control; the engineer, one trained in chemistry and ventilation, familiar with industrial processes, materials and job analysis, capable of making the necessary determinations of working environment to establish the extent of exposure to toxic materials and interpreting results of his determinations in terms of recommendations for control of conditions hazardous to health. Building from this nucleus, a well rounded bureau would include laboratory workers versed in the special procedures of dust counting and determination of the minute amount of poisonous materials to which workers may be exposed, and a secretary capable of acquiring an intelligent appreciation of industrial hygiene in general, to assist in maintaining a complete reference system so important in this work and, if possible, to make abstracts and translations of the most important papers. An industrial physician should be attached to the group to undertake activities to be outlined. With such personnel of technically trained men, who in the aggregate possess a broad knowledge of industrial hygiene, the bureau is in position to cope with the various phases of occupational disease control.

It is essential that adequate tools be placed in the hands of this personnel in the form of a well equipped laboratory and a well chosen library. The laboratory should include facilities for making both the chemical and the physical determinations incidental to learning the amount of injurious material to which the workers may be exposed. Our bureau has made a list of essential equipment and the approximate cost of such equipment, a limited number of copies of which are available to any one interested in developing such a laboratory. The library, of course, contains the standard works on industrial hygiene. The subject is, however, progressing so rapidly that it is necessary to follow the advances in the current journals containing papers on industrial hygiene and to accumulate a reprint collection of the outstanding papers. A reference card system is of course essential to make all this information easily available.

Whenever there is a full time plant physician, the bureau should work through him and make its report to him. When reports of cases are investigated, contracts should first be made with the private physician who reports the case. Information that will assist in diagnosis and in treatment should be made available to him. The industrial physician attached to the bureau has a large field of activity in connection with such investigation of cases in addition to handling the medical phases of requests for information and consultation on occupational disease subjects.

IN CONNECTICUT, in addition to receiving and investigating reports of occupational disease cases and providing a central source of information for physicians, industry or any agency interested in the cause, treatment and prevention of

occupational diseases, the Bureau of Occupational Disease makes surveys and field studies of workroom environment, including special determinations of dusts, fumes and gases and other toxic materials, measurements of ventilation, illumination or any condition or process thought to be affecting the health of industrial employees, to determine whether the environment is safe or where and to what extent a health hazard may be present.

Each industry in which a study or survey is made receives a complete report of the study, including the results of actual physical and chemical determinations of the working environment and exposure of the individuals engaged in it, with recommendations for the elimination or control of any hazard that may be shown to exist.

The reports of these investigations are not just mailed to the industry but are presented by a technically trained man and discussed with the physicians and engineers of the organization. The information presented not only establishes the nature and extent of an existing hazard but provides constructive data for its control.

In any program for the control of occupational disease, the cooperation of the medical profession and of industry is essential. The reports of cases of occupational disease coming for treatment to the practicing physician provide an important factor in their control just as do such reports of communicable diseases in their control. A close cooperation with the practicing physician is essential if progress in the solution of the problem is to be made.

In order to obtain the cooperation of industry, it is necessary to provide it with definite data. The exact nature and extent of a potentially hazardous condition should be established as a basis for its control. This procedure is more intelligent and more effective than the use of arbitrary orders issued by law enforcing agencies and based on cursory inspection. Industry is penalized through compensation payments if its environment causes occupational disease. When industry is definitely shown that a health hazard exists, it has been my experience that it takes the necessary measures to control the condition as a matter of good business.

In Connecticut the law requires all physicians having knowledge of a case of occupational disease to report it to the state department of health. These reports are confidential and cannot be used in compensation or court cases. The department is empowered to make investigations of any condition reported to it or suspected of causing occupational disease, and the result of its investigation cannot be used in court or compensation cases.

The cost of development of a bureau or division of occupational disease in the health department need not be excessive. We began the Bureau of Occupational Disease with one physician trained in industrial hygiene and a secretary. The first thing done was to classify Connecticut industry and the potential hazards in them. After the first year we added an engineer, familiar with industrial processes and trained in industrial hygiene, who did field and laboratory work. A laboratory was established at this time. Three years later another engineer, concerned principally with the laboratory work, was added.

THE activities conducted by our bureau have followed this outline. during the first year we had possibly a dozen or two inquiries regarding occupational diseases, industrial processes, the effects of materials and methods of protection. In the past year demand for consultation had grown to 463 requests for information relative to the effect of materials, methods of control of processes, diagnosis and the like, not including consultation in connection with field trips. In addition, 32 technical studies were conducted and 148 surveys made. These surveys covered 24 specific hazards found in 71 types of operations.

The work has resulted in definite improvement in working conditions. changes in processes, substitution of materials, and, in a number of instances, the purchase of entirely new equipment, not as the result of mandatory orders but because of the fact that these industries were given definite concrete information on the effects of environment on health. Requests for this service from industry have been so numerous that we have had to schedule work months in advance.

SUMMARY: 1. There are more than 15,000,000 persons gainfully employed in manufacturing, mechanical industries and extraction of minerals in the United States.

2. In these industries there are more than 900 occupations potentially hazardous to health.

3. The health of workers engaged in industry is affected by the conditions, materials and processes used. An unhealthful industrial environment not only causes specific occupational diseases but increases the incidence of tuberculosis, pneumonia and the degenerative diseases. These excessive rates not only affect the industrial population but increase the rates of morbidity and mortality in the general population.

4. The life expectancy of the industrial worker is seven years less than that of those otherwise employed.

5. Occupational disease costs are increasing and taking tremendous and unnecessary toll from workers and industry.

6. Occupational disease is preventable by correcting unhealthful industrial environment.

7. Occupational disease control is essential to protect this large industrial group from increased incidence of disease.

8. The protection of the health of those engaged in industry against injurious occupational environment is the responsibility of public health authorities.

9. The cooperation of industry and the medical profession is essential in any program of occupational disease control.

With a set-up such as I have described, in which the law provides that the result of investigations cannot be used in compensation claims, with a specially trained technical personnel to make determinations and interpret the conditions found in industrial environment, industry is provided with just the information it has a right to demand before it is required to change its processes, substitute materials or take other necessary control measures.

It is our experience that when industry is approached by a health agency in behalf of a health program and is presented with definite data regarding its working environment, in a spirit of service, with the assurance that the results of the investigations will not be used in furthreance of claims against it, industry not only accepts the service as a matter of good business but actually requests the assistance of such an organization in the improvement of its general working conditions.

Abstract of Discussion:

DR. C. O. SAPPINGTON, Chicago: The bureau that Dr. Gray directs in Connecticut is an outstanding example of organization and system in regard to the control of occupational diseases. An important consideration in the administration of such a bureau is that, when a state-managed bureau goes into this type of work, it is essential that the information be confidential and be not used in the adjudication of cases before either commissions or courts, because if that should be done, one can immediately see what confusion would result. Another important thing is the necessity for the training of professional personnel. There is a tremendous lack in that regard. There are some engineers available. There are also a few medical men available who are fairly conversant with this subject. This is a serious problem, and a means of working out the postgraduate training of engineers and practitioners is something of great moment. The economic situation is rather serious in that many states are considering compensation laws regarding occupational diseases, and it is necessary to give due consideration especially to including in those laws such principles as will permit them to be underwritten by insurance companies, thus providing the economic background for the carrying of this difficulty. Unless this can be done, a situation beyond control arises.

DR. R. R. SAYERS, Washington, D. C.: I should like to ask Dr. Gray whether he will tell how he finds out where hazards are. Various methods have been used at different times and I know that he has had good practical experience in finding where they are. I should like to have him call attention to how one can get doctors to report occupational diseases.

DR. GRAY: One of the first things the bureau did was to make a classification of Connecticut indus-

tries, and they fall into about 100 classifications. We then classified the potential hazards that may occur in them and constructed a chart. We have cases reported to us and these are investigated. We know in what industries potential hazards exist. These are surveyed, and if necessary a study is made to determine whether the condition is safe. We have yet to go into an industry in which we knew that a potential hazard existed and where we were not welcome and haven't felt that we would be invited to go back again to give assistance in some other problem. Requests have been so numerous that we have had to schedule our work months in advance. Many industries in Connecticut never think of changing their processes or making any changes affecting hazardous materials without consulting us and calling on us for information relative to the proper method of doing it. I think it is largely due to the fact that they realize that we are not a punitive or a press agency but a service department, for, without at all abrogating our right as health officials to correct a condition in which we do find hazards to health, the work is conducted in a spirit of service rather than law enforcement alone. When industry is provided with definite information that a health hazard exists and what to do to control it, it becomes a matter of good business to take care of it, and mandatory orders are seldom necessary. We have been doing this work for five or six years, and labor, industry and the insurance interests are requesting the service to an extent greater than our capacity to provide it.

DD. HUNTINGTON WILLIAMS, Baltimore: May I ask Dr. Gray if he would not say that his law, which makes the reports not available for subpoena in litigation over compensation, is a fundamental part of his ability to do this work, and, if so, what steps he would suggest for bringing about that kind of change in the law in other states in which it isn't present?

DR. GRAY: I think it is fundamental. I feel quite sure that, if we went into a plant and they knew that if we found very bad conditions the result of our investigations or reports of cases could be subpenaed and used in compensation claims, we would have much more difficulty in securing their cooperation. The cooperation of industry is essential in eliminating industrial health hazards, and this can best be secured by conducting the work as I have outlined and not penalizing industry by making reports and results of investigations available for claims against industry. When industry realizes the results of our investigations, that the reports cannot be used by either party in compensation claims, they show us the very worst conditions of the plant. It is common experience for us to go into a plant to investigate some particular hazard and, after our report is made, to be requested to investigate other plant conditions. They realize that they are really being given a service of inestimable value by an agency that is absolutely unbiased. I want to say that we are not satisfied with reporting. I don't suppose any health officer is, whether it is a communicable or an occupational disease. There are a number of reasons why reporting is not satisfactory, but how much less satisfactory reporting would be if a doctor attached to a factory knew that any report he gave us could be used by a man coming before a compensation court! While reporting has improved considerably, there is much more work to be done on this phase of the problem. Close contact must be maintained with industrial physicians and reports of cases carefully investigated.

DR. JOHN SUNWALL, Ann Arbor, Michigan: How many of the states have these departments?

DR. GRAY: About eight states are doing this work, but one or two of them have had to curtail their program during the depression. Michigan did have a department for this work, but I believe it has not been able to do much during the depression. There are at least five states in addition in which commissions or personnel have been appointed by their legislatures to investigate the problem of occupational diseases and the setup necessary for control.

DR. L. D. BRISTOL, New York: On the assumption that a number of industries throughout the United States have no particular problems from the standpoint of occupational diseases as such but are concerned largely with such things as the common cold and disorders of the upper respiratory tract in general, what does the State of Con-

THE BULLETIN

of

The American Association of Industrial Physicians and Surgeons

THE objêct of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for the mutual advancement in the practice of their profession.

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necticut Department of Health through the Bureau of Industrial Hygiene do to assist the small industries with reference to some of the other important phases of industrial hygiene? I have in mind health education, medical examinations, periodic health examinations, and all those factors in an industrial health program that many small industries cannot cover. It seems to me that the state health department may have a very definite opportunity and responsibility in extending a program of health education and other services of an examination character to smaller industries. The large industries throughout the United States are able to set up their own individual services and personnel, as well as programs for carrying on work not only in the interests of preventing occupational disease but also in the interests of health education of employees.

DR. GRAY: The answer is that undoubtedly, while these suggestions are all desirable, we must concentrate on those that are most important. I am not sold on the idea of the state department of health doing physical examinations. That should be left to private physicians. I feel that any industry should be able to pay, when necessary, for a private physician to do physical examination. There is another factor, too: that a large industry, with plenty of money and doing splendid things for its personnel, is able to sell the idea of physical examination to its workers; but in the smaller industry, as soon as one suggests physical examinations and reexaminations one is going to run into difficulties. It is difficult to sell the idea of physical examinations to labor in small industries, which are proverbially suspicious of the use that will be made of the results of the examination. Even supposing there could be a law that would not permit such records to be used outside the department of health, it would be extremely difficult to persuade labor that they are going to be used for placement and not for getting rid of some person who has some physical impairment. I acknowledge the desirability of the things the previous speaker mentioned, and I think that after some of the conditions I have mentioned have been cleared up, perhaps something more can be hoped for. The gentleman says that the important things are the colds and conditions incident to ordinary employment. This is not true in Connecticut. We have been overwhelmed with requests to take care of actual, definite hazards to health.

Industrial Accidents

THERE is a very great difference between ordinary accident work and industrial accident work, for several reasons. One is the mental attitude of the employee which is influenced very definitely by the compensation laws. Another factor is the effect of the attitude of the various foremen in viewing the situation from the angle of production and continuation of work of employees; so that it becomes a rather complex subject. The importance of industrial surgery has been growing in the minds of the medical profession in recent years. It has acquired a place in the sections of the American Medical Association, and we are devoting attention to it ourselves in our State Society. Among the first to pay special attention to industrial accidents were the railroads. One reason for this early manifestation of interest was the Interstate Commerce Commission. As those of you who do railroad work know, an accident which results in an employee losing more than three days from his work is what they call a reportable accident. This requires a special in-

* HAROLD A. SPILMAN, M.D., Ottumwa, Iowa, presented before the Eighty-fourth Annual Session, Iowa State Medical Society, Davenport, May 8, 9, 10, 1935; published in *J. Iowa State Med. Soc.*, November, 1935.

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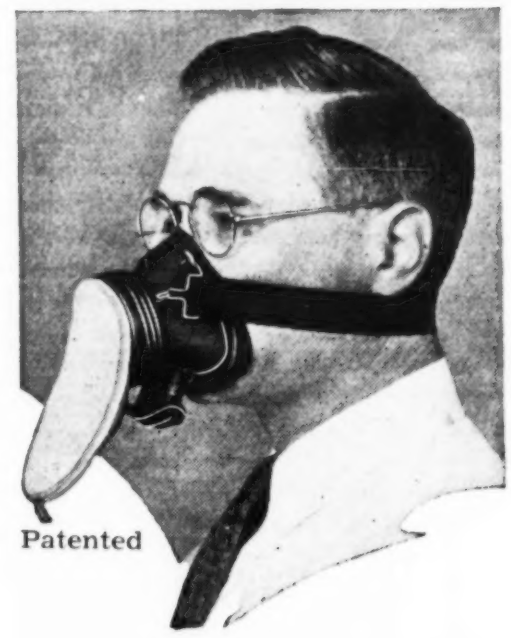

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"IT SHALL be the duty of the Division to investigate conditions of occupation with reference to hazards to health and to determine the degree of such hazards, to investigate and evaluate methods for the control of such hazards to assist in the preparation of rules and regulations for the preventing of occupational accidents and diseases, and, in cooperation with the department of public health or otherwise, to promote occupational health and safety education."—Sec. 11A of the law creating the Division, effective 1934.

vestigation and report to the Interstate Commerce Commission. This has reacted beneficially on the accident rate, but it has also resulted in some evils, because the railroad officials have gone to extremes to prevent the reporting of accidents. I have even known instances in which an employee was continued on a duty status with another employee to do such parts of his work as he was unable to perform, simply to prevent a "reportable accident." That is foolishness, yet it occurs; but the rule has materially reduced the rate of occurrence of railroad injuries.

The safety program has reduced the amount of disabilities resulting from accidents, by discouraging unsafe practices. Just recently I had an opportunity to review a five-year study of the medical department of a large industrial plant, for the years from 1930 to and including 1934. In 1930, with an average number of 1,818 employees, 463 employees required medical attention. That is practically one in four, one in 3.93 to be exact. Of these 463 employees requiring attention, 177 were lost-time accidents; that is, they lost one day or more from their work. Of these, 22 resulted in partial permanent disability and one in total permanent disability. In 1931, with an average number of 1,787 employees; 406 required medical attention, one in 4.4; including 193 lost-time accidents, 22 partial disabilities and one total permanent disability. In 1932 there were 1,743 employees, with 443 requiring medical attention, one in 3.93; 148 lost-time accidents, with 16 partial disabilities. In 1933, with 1,848 employees, there were 488 employees requiring attention, one in 3.78; 138 lost-time accidents, 19 partial disabilities, and one total permanent disability. In 1934, 2,032 employees, 567 employees requiring medical attention, one in 3.58, with 142 lost-time accidents, with 14 partial disabilities. You will note that throughout those five years there was about one in every four of the employees requiring medical attention, and there was a definite relationship in lost-time accidents. For 1932, 1933 and 1934, it was possible to show the rate of lost-time accidents per million man-hours worked. For 1932 it was 34 accidents per million man-hours, for 1933 it was 32; and for 1934 it was 31, showing a definite decrease.

Another interesting fact that these statistics showed was the group of employees that we refer to as accident-prone employees. During those five years' time there was a total of 1,449 employees requiring medical attention. Sixty-three of those employees had six or more injuries, varying from six to 16 in number. An analysis of those accidents showed many of them to be preventable by proper attention on the part of the heads of departments.

An analysis of these accidents shows a certain type of grouping. Infections are divided into two groups: those in which the original injury was promptly reported, and those in which it was not. They will vary from two to one to three to one, in numbers. For instance, in 1930, 26 infections occurred, which were not promptly reported, and 14 which were. In 1931 the totals were 37 and 13; in 1932, 22 and 10; in 1933, 12 and four; and in 1934, 18 and nine. Cuts, bruises, sprains, fractures, hernias, back in-

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juries, burns and the miscellaneous group, comprise the remainder.

Infections form a very important group of cases in industrial accidents. If we can control those cases, we will materially reduce the disabilities resulting, the time lost and the cost of administration of the medical department. In the final analysis, the only way that we as doctors can talk to the average industrialist is to show him where proper medical and surgical attention affects his pocketbook.

A group of these cases extremely interesting to any man dealing with industrial cases where edged tools are handled, is the group of cuts involving tendons, especially the flexor tendons of the fingers. I have talked to many men who are doing this work and have studied not only my own records at this industrial plant for the last two years that I have had it, but for three and more years before. I believe that we obtain satisfactory repairs of the cut flexor tendons when they occur near the distal end of the fingers, in about one in four, in spite of using every aseptic precaution that we can. It is hard to tell why the result is so poor. If it were myself alone, I would feel that perhaps I had slipped in my technic somewhere. I have had a large number of men tell me that they had about come to the point where they did not want to repair those cut flexor tendons of the fingers; they would rather pay for the disability and the loss of function that exists. I recently had a patient with a cut flexor tendon on a forefinger. I did make a longitudinal incision to expose the tendon, but I made no effort to isolate it or to suture it directly. I sutured the tissues about it, and I think I got, without doubt, the nicest result. I do not believe I am going to have a 10% loss of function.

In closing this, I realize that it is impossible, in the time, to cover the subject fully, but I want to emphasize the importance of prompt attention to minor injuries in the plant, wherever it may be, prompt and efficient, and the avoidance of infection, the importance and necessity of frequent x-ray pictures in all cases in which a fracture might have occurred. A great many reports may be in the negative, but those in authority will be only too happy to receive negative reports. I recently saw a patient whose forearm was injured, but no fracture could be detected clinically. Some six months later the case came under my observation with evidence of nerve impairment and loss of function. An x-ray at that time showed a fracture to have existed in the radius, and it cost that company a good many hundred dollars that need not have been spent.

As I say, in industrial work, you must emphasize the effect on the pocketbook. When we can show the industrialists the value of proper medical and surgical attention as related to their pocketbooks, they will be with us 100%.

Discussion

DR. J. A. WILLIAM JOHNSON, Newton: It is difficult to discuss a paper when one agrees with all that the speaker has said. The subject, industrial accidents, is most fitting, and represents thoughtful research. The observations are keen, the reasoning clear and concise, and the deductions profitable.

Since the workmen's compensation laws were enacted some 25 years ago, trauma has been seriously considered by both medical and legal professions. From the industrial standpoint trauma is destined to occupy a very important place in the practice of medicine and surgery, as evidenced by the interest taken in this subject by the A.M.A. and the A.C.S.

The immediate effects of contusions and lacerations, burns and scalds, fractures and dislocations, have been given voluminous descriptions and considerable attention. The remote results, although less apparent are just as grave in their effects and requite equally serious attention. I would mention the "industrial back." It is a frequent cause of idleness, fraud and malingering. It means $18 a week in compensation, which is no bait for the thrifty, but to the malingerer it beats working. It causes confusion in the minds of judges, juries, compensation boards, lawyers and doctors, and often leads to injustice to the employee and employer, and to waste of time and funds. The common causes of mistakes in handling injured backs fall into three main groups, and it is the doctor's duty to correct all three of them.

1. Errors resulting from ignorance of true anatomy, physiology, and pathology of the spine.
2. Inefficient and inaccurate methods of examination.
3. Improper treatment based on faulty diagnosis.

I think more attention is paid to fractures today than ever before. The use of the x-ray shows that each fracture is a case unto itself and requires special attention. The medical student learns the use of suspension and traction, the Hodgen splint and the Steinman pin. He sees what can be done under the fluoroscope, and the application of the plaster of paris splint to hold the fragments in place, while an immediate x-ray film checks the results. He learns that there must be normal weight bearing lines to avoid abnormal strain on joint ligaments which will result in pain and diminished function as long as the deformity lasts. In spite of good bony union he also learns that the patient has not recovered until joint function and muscle tone have been restored. The outstanding surgeons throughout the world are giving their attention to fractures. I feel that no physician should take an industrial accident case unless he is willing to go the limit in diagnosis and treatment, for the good of the patient, the employer, the insurance company, and for his profession's sake.

A young man came to me about six weeks after he had slipped and fallen in a sitting position, while pulling a hand truck over a cement floor in a small factory. Pain kept him awake day and night. Swelling of the left buttock kept him from sitting. He could only lie on his abdomen or sides. The swelling was hot, tender, shiny and gave that peculiar feeling to the sense of touch that tells you there is pus under pressure. I opened his buttock under ether down through the fascia and considerable pus, due to bruised and necrosed muscle, was liberated.

A big problem in industrial accidents is the repeater, the man who in spite of the fact that the machine has guards, will get a finger or a hand cut off, after he has just returned from a lay-off due to a broken leg. He is a misfit in the industrial world of high speed machinery. His speed of working just does not coincide with the speed of the machine on which he works. He is out of rhythm with machinery and should be doing something else. Perhaps his domestic troubles are at fault. Improper food, fatigue, ill health, and bad atmospheric and lighting conditions all tend to increase liability to accidents. Those who fail to pass certain sensorimotor tests have been found by psychologists to have an accident rate two and one-half times greater than those who pass the tests.

Without a doubt the responsibility of the surgeon who treats the injured workman is greater today than ever before, due to the man advances in medical and surgical treatment. Better results are expected. The employer realizes the importance of efficient medical work, and accepts the expense attached thereto as a part of his overhead. Today many industries have departments of rehabilitation which means restoration, vocational training and adjustment of the injured. This calls for early physical therapy, active cooperation of the patient in the voluntary use of the injured part and the early return to work as the best form of occupational therapy. The loss of time from accidents can thus be reduced. The close cooperation of employer and employee is essential; without it the work of the surgeon is defeated.

Injection Treatment of Varicose Veins

COLT[2] and his collaborators found that the injection treatment of varicose veins with salicylate (40%)-saline (10%) solution is safe and satisfactory in patients presenting a single varicosity, generally with a positive Trendelenburg sign, and a more extensive type of varicosity with a positive Trendelenburg sign and with a greater degree of deep reflux. Although great amelioration takes place, a cure does not follow. It is as yet uncertain from the results published if more than amelioration can be obtained by operation, or by operation combined with injection, in this type of patient. In a small proportion of cases injection alone is not entirely successful, and ligation of the internal saphenous vein below its upper end is indicated as an adjuvant. No evidence sufficiently strong has yet been published to justify primary saphenous ligation in preference to primary injection with salicylate-saline solution. Almost all cases that have failed to react to other solutions can be successfully treated with salicylate-saline solution. The converse is not true, but sodium morrhuate appears to answer well in short lengths of vein when salicylate fails. Longer intervals than those commonly given between injections are evidently necessary if the accepted pathology of sclerosis is to be the guiding principle in treatment.

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The Doctor's Dilemma

A DOCTOR has a tough job.* He has to deal with the obviously preposterous, but universally held, belief that a good doctor knows all the right answers. When a doctor tells a patient that he doesn't know what is the matter with him the patient hunts up another doctor.

A considerable part of the ailments to which the flesh is heir are what are called cryptogenic—that is, nobody knows their origin. The common cold is a good example. And, speaking of colds, I am reminded of a droll tale.

I once consulted a nose and throat specialist about a cryptogenic ailment, and when he confessed that he could shed no light upon the matter I said that I thought I would try osteopathy; and what did he think of that idea?

His reply was that, speaking as a medical man, he thought the idea very poor. Speaking as a man, however, he added that osteopathy could certainly do no harm, and that if I wished to try it he could give me the name of a very good practitioner.

I went to the osteopath he recommended, and explained the circumstances of the visit. "Oh," said the osteopath, "I know Dr. So-and-so very well. He often comes here to have me treat his colds!"

The poor doctor is in a dilemma. If he admits his helplessness the patient will leave him—often for a quack whose treatment will do active harm. If he pretends to know when he doesn't, his conscience will trouble him.

As I observe the wonderful things that are being done in the practice of medicine I think of the wretched Mr. Pepys, with half a dozen men holding him down while his bladder stones were hacked out of him. That was the best surgery of what, after all, was only yesterday. We smile indulgently at it now, marveling that such primitive methods could exist in such comparatively recent times. Yet I suspect that our grand-children —perhaps even our children—will look on what is being done today with much the same sort of horror in which we look on the treatment of Mr. Pepys.

I have talked, these last few days, with some of the most brilliant scientific men in the world. Their knowledge of medicine and surgery is vast. Yet the plaint of one and all is the same—we know so little and there is so much to be known. Like Paracelsus, they are forever burning the books of yesterday, always peering wistfully into the shadowed future, groping for truths as yet unrevealed.

* HOWARD VINCENT O'BRIEN, in *Chicago Daily News*.

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